AN INVESTIGATION INTO SOME ASPECTS OF THE LOCATION OF CLOTHING RETAILERS IN METROPOLITAN CAPE TOWN.

A thesis submitted in partial fulfilment of the requirements for the degree of Master of Urban and Regional Planning.

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CHAPTER I

INTRODUCTION

A. The Subject and why it was chosen

The subject of this thesis is location analysis. There are two main reasons for the selection of this subject.

(1) Location analysis is a vital part of the Town Planner's task. The Planner is concerned essentially with co-ordinated and harmonious development and this development is often dependent upon the precise spatial arrangement of component parts. Despite this fact, an examination of the indices of Town Planning journals reveals an alarming shortage of literature dealing with this aspect of the Planner's vocation.

(2) A study of this nature enables the use and critical appraisal of tools of analysis which, to this writers' knowledge, have never been used before in this Country and which could be employed to great effect by Planners in many situations. The solution of procedural and technical problems besetting techniques is an important part of any research work.

The focus of the study, within the field of location analysis, is clothing retailing. Clothing is important in both quantitative (most American and British studies show that between 14 - 26% of retail expenditure is devoted to clothing)[1] and qualitative terms, for not

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1. Regional Shopping Centres in North-West England, Department of Town and Country Planning, University of Manchester, 1964.

Nelson, R.L. The Selection of Retail Locations, F.W. Dodge Corporation, New York, 1958.

Sternlieb, G. "The Future of Retailing in the Downtown Core", A.I.P. Journal, May 1963. p.p. 102 - 111.

Rosbill, O.W. "Town Planning and Retail Trade", Town and Country Planning Summer School, Report of Proceedings, Bangor, 1958. p.p. 6 - 35.

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only does it provide the essential covering required for warmth, health, comfort and compliance with existing morality mores, but it is becoming increasingly important as an expression of personality and as a status symbol. Because people are "clothes conscious", both consumers and retailers show a greater awareness and sensitivity to factors affecting the market. For this reason, clothing stores are probably the best single index of consumer - goods movement, and the movement of consumer - goods provides the best index of the growth and structure of commercial centres.

B. The aim of the Study.

The study, then, has three aims :

1. To examine the forces and pressures affecting the location pattern of clothing retailers in Metropolitan Cape Town.

2. To discuss, critically appraise and modify certain techniques which relate to location and other aspects of urban analysis.

3. Using clothing stores as indicators, to trace, explain and predict shopping centre changes, and to relate these changes to existing urban theory.

C. The Approach to be followed.

The work is divided into five sections.

In the first section, the pattern of clothing retailers is examined on a metropolitan scale; that is, broad areas of development are noted and explained and the forces causing the pattern discussed.

In section two, attention is focused on the individual centres forming the larger pattern and on the arrangement of uses within them. Particular attention is given to the relationship between clothing retailers and their competitors, and to the search for generators.

Section three deals with another aspect of location - the spatial affinity of clothing stores to other retail concerns.

In section four, the focus is shifted to the individual store. Location requirements and techniques to facilitate the realization of these requirements are discussed and factors determining turnovers are weighed against the main cost items for Cape Town stores.

Finally the role of the Planner in the provision of retail facilities is mentioned and a new approach to the problem of retail location suggested.

D. Methods Used.

The methods of data collection and analysis used in this study will be discussed at appropriate points within the main text.

E. Definitions

It is necessary that the terms " a retail store" and "a clothing retailer", as used in this study, be defined.

"A retail store" is any fixed place that is visited by the consumer to purchase goods or non-professional services. This definition eliminates businesses which sell to consumers through mail or telephone orders. Many retail stores have some mail and telephone sales, but if these should predominate the effect of the specific location on business volume becomes indeterminate and largely unimportant. A retail store, therefore, is primarily a place that the consumer himself must visit and the location problem has to do with facilitating these visits.

In this study, two different definitions of "a clothing retailer" have been used and it is important to distinquish between them. In the maps and measurements which describe and analyse the spatial distribution of clothing retailers those Department Stores, Variety Stores and General Dealers which have large clothing departments have been included in the definition. It is felt that these stores play a significant role in the supply of clothing to Cape Town consumers and they provide competition for those stores which deal exclusively in clothing. Consequently, clothing stores take cognaissance of them in determining their location.

When factors affecting location are discussed, however, the definition of clothing retailers excludes the Department, Variety and General Dealer Stores, for their locational requirements differ, sometimes subtly, sometimes considerably from those of clothing stores.

CHAPTER II

The Pattern of Clothing Retailers in Metropolitan Cape Town.

In order to examine the pattern, data on the changing location of clothing stores over time was collected. It was decided to collect information for those years which, it was felt, were fairly representative of a particular "period" (defined in terms of retail development), and which, wherever possible, were coincident with a population census.

Therefore the years, 1904, 1911, 1921, 1936, 1946, 1951, 1960 and 1969 were chosen. Information for all years up to 1960 was plotted from the relevant issue of "The Cape Times Directory". (Unfortunately no information on the Northern Suburbs was available prior to 1960). All data for 1969, however, was collected by means of a field survey, as an initial pilot study in the Wynberg area indicated that there were two important factors which could not be obtained from the "Cape Times" Directories.

(a) The degree and arrangement of specialization amongst clothing stores. (i.e. men's, women's, or general stores)

(b) The quality of stores.

The former provided no real problem; it was easy to see in the field whether a store provided men's, women's or general clothing. Quality, however, was more difficult to appraise effectively. Although consumers readily identify differences in the quality levels of business establishments, they do so only on the basis of subjective ratings accumulated and stored subconsciously from years of experience. This method is obviously fallible, and rating results vary widely from person to person. Little work has been done on the quantification of quality, and it was eventually decided to use a modification of a technique derived by Ross. L. Davies to determine quality[2]. Davies defined.

2. Davies, Ross L. - "Effects of Consumer Income Differences on the Business Provisions of Small Shopping Centres" Urban Studies, 1963. p.p. 150 - 162.

quality according to six factors considered indicative at varying levels or degrees by consumers. The quality factors were :

Shop Appearance;
Window Display;
Prices;
Range of Good;
Type of Good;
Degree of Specialization.

For each factor, a rank was assigned to each shop according to a scale where three represented a highest rating and 0 a lowest rating.

The main problem with this technique is that three of the six factors - shop appearance, window display and degree of specialization - are

highly subjective, and as the removal of subjectivity is the precise reason for developing a quantitative technique, it was decided to combat this. Therefore, a pilot study was conducted in Wynberg. (It was subjectively felt that this centre provided a wide quality range). Davies' factors were ranked and a mean for each shop calculated. These results were then compared with those obtained by using this writer's modification - a combination of price, range and type. The price factor was weighted in the latter set of measurements, as it was felt that price was the best single index of quality, and only those prices shown in the Display Window were used (the rationale behind this is that the display window is aimed at potential customers - i.e. those people whom the store is hoping to attract - and the income level of this tributary population determines the quality of the store. Thus poor quality shops will not appear in high income areas and vice versa). A statistical comparison of the difference between the means showed no significant variation and thus the modification was adopted as :

(a) it is quicker and simpler to use.

(b) it removes any sort of subjective assessment.

It must be noted, however, that this method is not a particularly sensitive one. It works well when shops are being grouped into a few broad classes, but finer shades of distinction are swallowed, as prices of similar articles do not grade but are stepped.

All information collected is shown on Map 1 and Plates 1 - 9.

Location on a Macro-Scale

Before examining the pattern in Cape Town, it is necessary to outline the theoretical background to the commercial structure within cities.

All land-users seek particular location, but no two locations are identical, for each site is the focus of a unique combination of social and economic forces. Every retail concern prefers that situation which is most convenient to the group of potential customers it seeks to serve. But since there are many retail outlets seeking to serve every group of consumers, it is apparent that all concerns cannot be located with equal convenience. Thus the ultimate retail pattern is determined by the market process of competitive bidding.

It is generally accepted to-day that the hierarchy of commercial centres within an urban area corresponds with the hierarchy of urban centres in general; that is to say, central place theory, as advanced by Christaller, Losch and others, and particularly as modified by Berry and Garrison, applies within the City. One of the most common criticisms of the Christaller-Brogue - Loschian model is that, in reality, hexagonal patterns do not appear within Cities. Berry and Garrison [5] answered this criticism by retaining

3. Garrison, Berry et al: Studies of Highway Development and Geographic Change, 1959 p.p. 54 - 6.

the principles of central place theory and yet freeing the model from any set form or shape. They did this by developing a model for the location of business and service centres which emphisised two of Christaller's concepts - range of the good and threshold. They claim that as many centres supplying a certain good will exist as there are threshold sales levels to support the centre. These centres compete spatially and thus are distributed so as to supply their own thresholds more efficiently. If total sales levels are exact multiples of thresholds for the good with the largest threshold (N), market areas will be bounded by the lower limits to the range of A centres (centres supplying N goods). Firms will then only earn normal profit. The A centre will also supply all goods of a lower order than N, for these require a lower threshold. However, as the order of goods decreases, an order is reached for which the interstitial purchasing power located between the threshold market areas of A centres reaches threshold size. In this case, greater efficiency is obtained if a second set of centres, which may be termed B centres, supply the good.[4] A good of this order is known as an "Hierarchical marginal good". Similarly other

4. Ibid, p. 53.

centres (C, D, E) may arise. The location and size of these service institutions depend upon the density of population, the social character and the standard of living in the areas they serve.

It is now proposed to examine, in broad terms, this theory in the light of the historical distribution of clothing retailers in Metropolitan Cape Town.

The Pattern in Cape Town.

The pattern of development is shown in Tables 1 - 8, and these tables bring out a number of important facts which relate to the theory of Tertiary activity.

The initial pattern of development reflects faithfully the distribution of population. (see table 9. In this section population figures have been used as broad indicators only. There are two reasons for this :

(a) The tributary areas of shopping centres are not constant, but vary over time.

(b) Ward boundaries have changed significantly three times between 1911 - 1969. An attempt was made to reconvert the changes into common areas and to adjust population figures accordingly, but the changes required were too great for the results to be acceptable.)

Initially (1904, 1911) most people lived around the C.B.D., Woodstock, Wynberg, Claremont and Simonstown. If the numbers of clothing stores in Victoria Road, Albert Road and Observatory are added together to make a distributional area comparable with the population area, then the rankings of stores and population correspond exactly. (Tables 8 and 9) In 1921, however, the effects of a economic recession can be seen. The number of stores in lower income areas - District Six, the Malay Quarter, Woodstock, Salt River etc., fell at a much faster rate than in higher income areas, and the proportion of stores in the C.B.D., which commands a metropolitan-wide trade area and which is obviously less dependant on local fluctuations, increased considerable. This is clearly shown in graph 1, which shows the number of stores found in the C.B.D. as a proportion of the total number of clothing stores in Metropolitan Cape Town (i.e. it shows the rate of decentralization), and it indicates a very important locational and planning principle:

In lower income areas, shops go to the people while in higher income areas people go to the shops. The crux of this situation lies in mobility. In lower income areas car ownership, and thus mobility, is restricted. Consequently, composite trade areas are restricted and are substituted by myriad local trade areas.

Population increase, particularly in South Africa, tends to distribute horizontally rather than vertically at one point. Consequently at various points along a line or within an area, marginal threshold levels are reached and shops appear to take advantage of the threshold. However, because of the horizontal spread, thresholds remain marginal and excess profits do not increase as population increase is absorbed into new threshold groups. Because of the marginal threshold, this "spread" type of shopping distribution is most affected by economic fluctuations. This point (marginal thresholds caused by a particular spatial distribution which in turn is caused by limitations on mobility) is further emphasised by percentage mortality rates per centre. (See Table 10 - these figures were obtained from Questionnaire returns. Questionnaires were sent to a sample of shops which were in operation in 1965. Undelivered forms to those shops which had moved or had gone out of business were returned by the Post Office, and percentage mortality rates were calculated from these returns.) Centres with low income tributary populations have much higher mortality rates than larger, higher order centres.

From 1921 - 1969, a comparison of population statistics and numbers of clothing stores provides broad confirmation of the correlation between them. However, the effect of income can also be seen (i.e. by comparing Woodstock - Salt River with Claremont and Wynberg). Unfortunately, it proved impossible to find satisfactory income or population figures per area, so the matter could not be persued further. The correlation between population income and nuber of stores, however, did not appear to be total, and certain factors, such as the fluctuating roles of Claremont and Wynberg were difficult to explain. Further investigation into clothing shopping patterns brought forth a number of interesting facts.

The implicit assumption underlying Central place theory or the theory of Tertiary Activity is that people will seek goods and services at those centres which are closest to them. Thus, given a population which is spread over a certain area, a number of centres (K centres) will arise to serve this population. These K centres will all be of similar order; that is, they will all provide certain kinds of goods only. As population increases, a total threshold will occur which is large enough to support a higher order good or service and this good or service will locate at that centre which is most accessible to the total area. This centre will thus increase in order (A centre) and in this way a hierarchy of centres develops. Again the underlying assumption is that the higher order A centre will serve those K centres which are nearest to it. Evidence uncovered in this study throws serious doubt upon this assumption. In certain low-income areas (particularly Non-White areas) which have low order centres, the pattern of shopping for clothing is different to the expected one. Some of these centres have clothing stores, but few people support these, and their mortality rate is high. Instead of shopping at the nearest centre of high enough order to provide sufficient clothing facilities, however, the majority of these people shop in the C.B.D. The explanation for this appears simple, as a great many of them work in town, but it goes further than this. Many of those who do not work in the C.B.D. make the trip to town to buy their clothes. This is because the C.B.D. with a tributary area encompassing the entire metropolitan area can provide greater range of goods than any one centre with a limited population threshold. The range of the goods is thus an attraction factor. However, some of those people who work in town do not buy their clothes there, but shop at some other centre (usually Claremont or Wynberg as most workers living on the Cape Flats break their journey at these centres to switch buses or to change from train to bus).

Two main inferences were drawn from these patterns :

(a) Accessibility is more important than, and is not coincident with, physical proximity.

(b) Within the broad bounds set by convenience, people are prepared to travel considerable distances to buy clothes in that centre, or from those shops which, for any of myriad reasons, appeal to them.

It was decided to test this latter inference in higher income white areas. In order to do this the accounts of two large clothing stores in Claremont were examined, in order to determine the distances people were prepared to travel to shop. Unfortunately, permission to

Plot these accounts was refused by the shop owners, but it was found that 15% of the account holders travelled from places which were more than 10 minutes travelling time distance from the centre. Moreover, nearly all of these were closer to other centres with clothing stores than to Claremont.

It is this author's contention that a hierarchy exists WITHIN various shopping good categories and particularly within the clothing category. Thus those people who buy "convenience" clothing (i.e. they are primarily concerned with clothing as a body cover and are not particularly concerned with its ornamental or status qualities) will be affected more by the distance variable than more selective shoppers will be. This contention necessitates an important revision on the Theory of Tertiary activity and of the measurement of hierarchies within urban areas. It is held here that the measurement of commercial hierarchies within cities must take account of quality. All hierarchical studies to date have merely used numbers of stores as an index. The short-comings of this approach can readily be seen in Cape Town. It was agreed intuitively by all urban workers approached by this writer that Claremont was a higher order centre than Wynberg. However, Wynberg has both a greater number and a greater range of clothing stores than Claremont. The essential difference lies in the question of quality. It is suggested here that future studies should take account of three main factors in determining urban hierarchies.

(a) Number of Stores

(b) Size of Stores

(c) Quality of Stores

It should be perfectly practical to implement this. The system proposed is a point index. Shops should be rated accordingly to quality by a system similar to the one discussed above. This rating value should then be multiplied by the square footage of the rated store. In this way, a serious obstacle encountered in present hierarchical studies is overcome. In lower income areas the number of stores providing a particular good may be quite high but,

(a) The size of these stores is much smaller than in higher order centres.

(b) The range provided is not as great, for many of these stores are, for the reasons of mobility discussed above, repetitive rather than complementary.

It is held that the pattern which emerges will be very different to that found in studies to date, but will be a truer reflection of the actual situation. The pattern expected is one of hierarchies within certain shopping good categories.

The Future

In attempting to predict the broad metropolitan distribution of clothing stores in the future, it is necessary to examine the rate and

causes of decentralization, and the role of the C.B.D. and suburban shopping centres in the retail structure of Cape Town.

The rate of decentralization is shown in graph 1. Between 1904 - 1911 decentralization did occur, but most of the "suburban" increase was close to the centre (in the Malay Quarter and District Six). Between 1911 - 1921 the decentralization trend reversed itself, as t lower income areas with marginal thresholds were hit harder by the economic recession than the C.B.D. which had, by virtue of its accessibility and captive population, a much larger tributary area. From 1921 - 1936 there was a sharp increase in decentralization and the reason is not hard to find. According to Dr. D.H. Davies the motor car became popular in Cape Town around 1920 (this statement was checked by this writer, who referred to back copies of Local Newspapers. Between 1920 - 1925 the number of references to, and advertisements for Motor cars were far greater than for the 1911 - 1921 period). Since 1936, however, decentralization has been increasing, but at a steadily decreasing rate. (See Table 11).

This pattern is the expected one and is easily explicable. After the initial large leap out from the centre, suburban centres are reaching a saturation point for clothing stores. It is probable that the pattern for convenience goods would be similar, but that the rate of decentralization would be much higher and the level at which the decentralization graph levelled out would be much lower. Before predicting the future decentralization and metropolitan distribution of clothing stores, it is necessary to examine some of the causes behind decentralization.

The causes of Decentralization - American experience.

In American cities the decentralization of retail activities from Downtown is an ever increasing problem and a number of urban workers have tried to analyse the reasons behind this phenomenon [5] The main reasons

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5. Horwood and Boyce. Studies of the Central Business District and Urban Freeway Development. Washington University press. 1962.

Ionassen, G. The Shopping Centre vs. the Downtown, Ohio State University Press, 1964.

Nelson, R.L. op cit pp. 9 - 18

Sternlieb, op cit.

Weiss, S. The Central Business District in Transition, University of North Carolina, 1962

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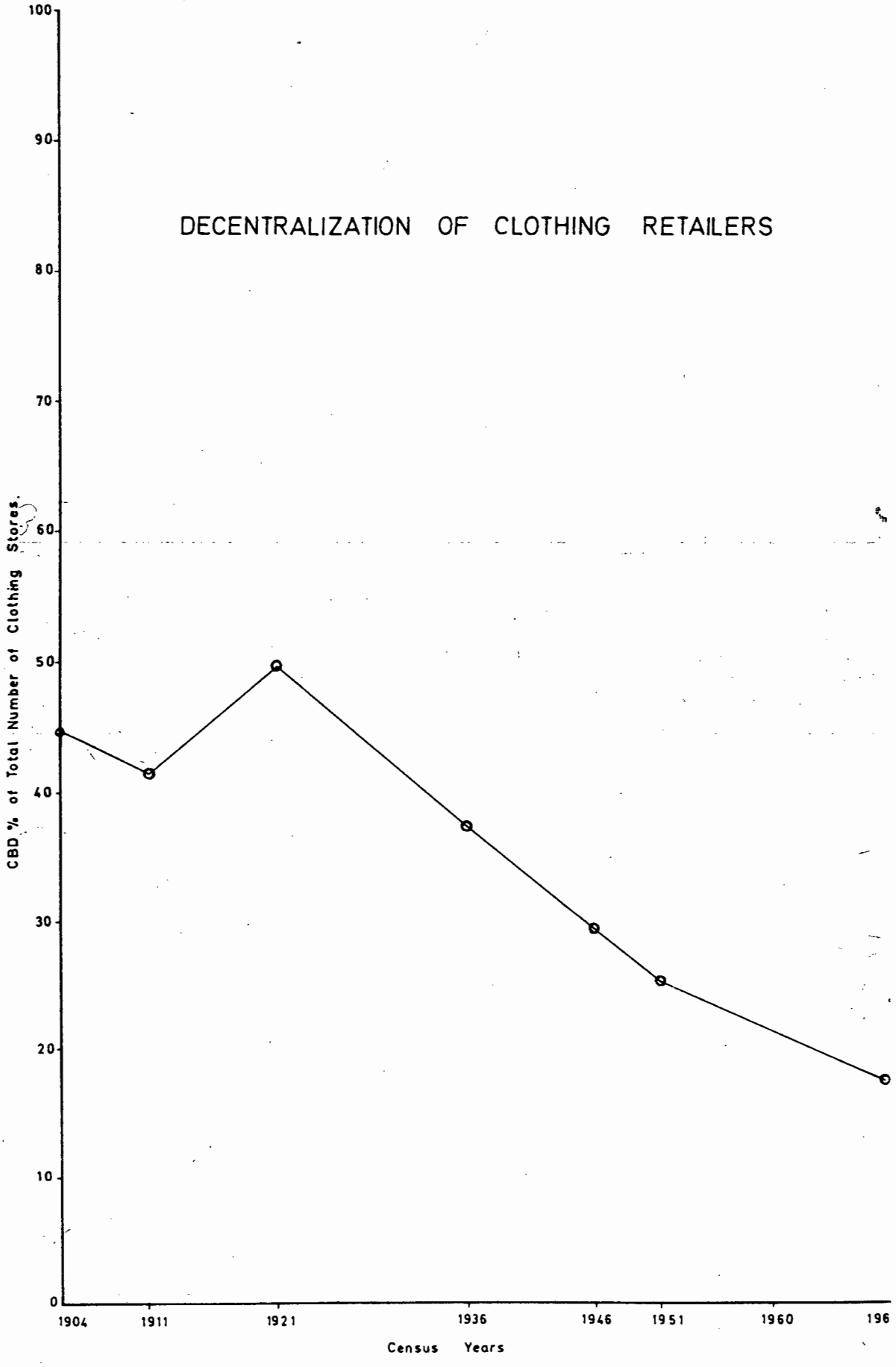
given are listed here in order that their relevance to the Cape Town situation may be examined.

(1) Shifts in Urban population concentrations away from the centre of cities due to the automobile syndrome and increases in per capita disposable income.


DECENTRALIZATION OF CLOTHING RETAILERS
CBD % of Total Number of Clothing Stores.
100
90
80
70
60
50
40
30
20
10
0
1904
1911
1921
1936
1946
1951
1960
196
Census Years

(2) The decline in mass transit use.

(3) The decline of shopping as a social activity.

(4) The decline of Captive population in the C.B.D.

(5) Greater mobility through the increase in car ownership.

(6) The increase of brand names, which has led to a decline in the need for comparative shopping.

(7) Disadvantages encountered within the C.B.D. These are forcing retail establishments out:

(a) Difficulties encountered assembling land.

(b) Congestion and lack of parking.

(8) The advantages of Suburban Shopping centres. These advantages are attracting retail establishments to the suburbs.

(a) Greater accessibility

(b) Greater spped and efficiency

(c) Easier parking.

The Situation in Cape Town

There are a number of factors which make the situation in Cape Town and in South Africa generally very different to that found in America.[6]

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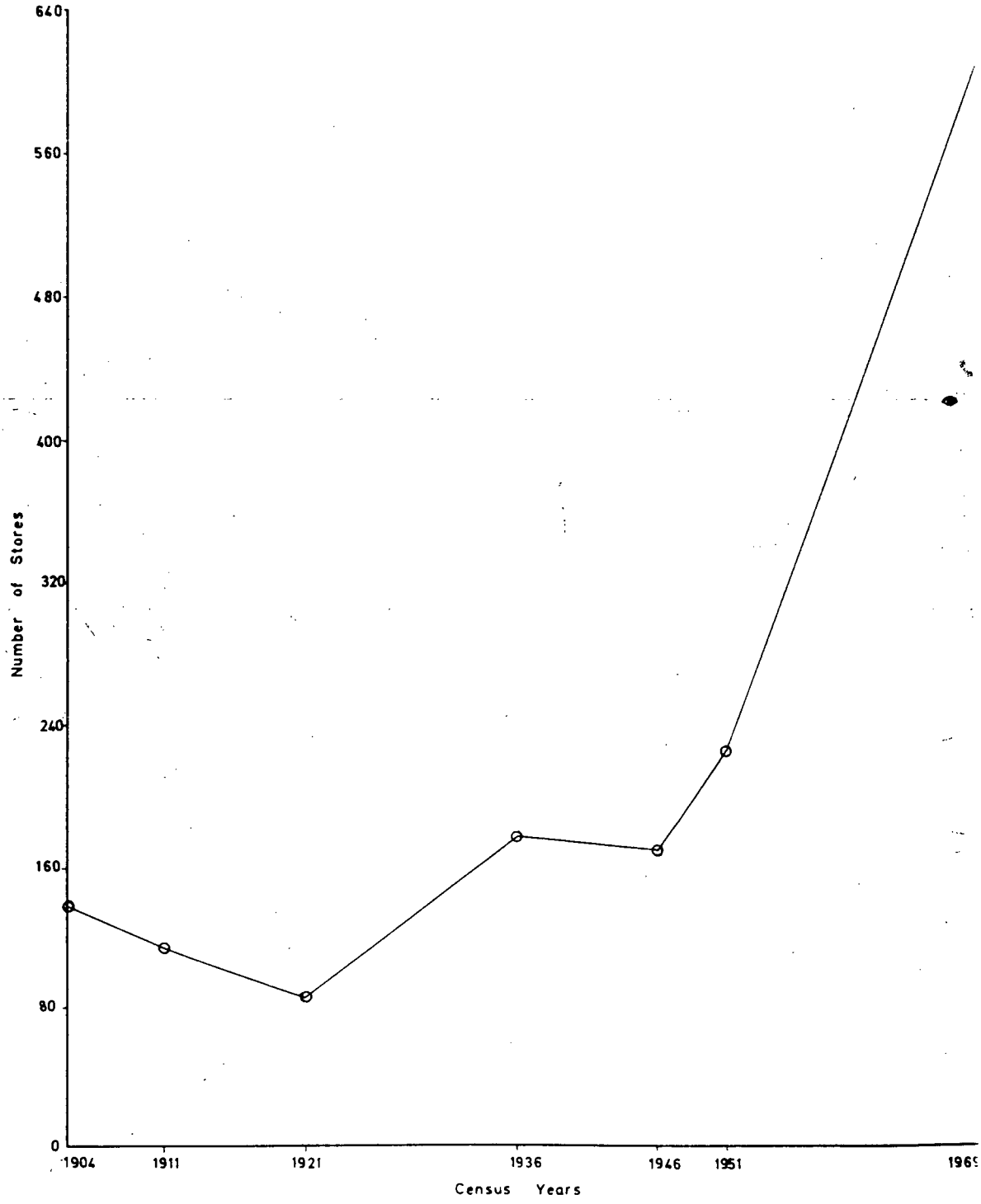
6. See Mallows, E.W.N. and J. Beinart, "Planning in the C.B.D. : The Potential of the Periphery", Traffic Quarterly, April 1966, for a discussion of some of these factors.

Firstly, the scale is different. In America horizontal shifts in population concentrations have been large while in Cape Town they have not been so great. Thus the concept of convenience takes on a new dimention. On the one hand, time distances from the centre often exceed an hour, while on the other, the vast majority of the metropolitan population live within twenty minutes of the centre. The effects of this have been two-fold :

(a) People have not been forced, through opportunity costs in time and money, to shop at suburban centres.

(b) The centre has always been in strong and direct competition with the suburban centres. As total thresholds are not high enough to support the regional distribution of higher order goods the centre has remained strong. Thus in effect, regional centres have not yet appeared in Cape Town. Suburban centres are merely community centres and as such have not made great inroads on the shopping goods oriented C.B.D., which is the only point

GROWTH OF CLOTHING STORES



where a full range of goods and services can be found. This fact is strongly supported by psychological factors. The image of the C.B.D. is far better than that of suburban centres, for many people believe the C.B.D. is synonymous with quality.

Secondly, public transport is still important for commuters of all races, and it is essential for the lower paid workers, particularly the Non-Whites. Average per capita car ownerships figures are far lower in South Africa than in America, and for low income groups the figure is very low. Thus for these people the centre which is the focü of public transportational links is still the most accessible point in the metropolitan area. Moreover, it is the only centre in which the lowest income population can find a full range of normal shopping services. The precise location of public transportation termini in Cape Town is another important factor. Because the railway was built before any severe increase in central land values had taken place the station was located very close to the centre and thus today passengers can be deposited within a few minutes walking distance of the centre. Bus Termini, too, are located in the very heart of the C.B.D. The result of these factors has been to strengthen the role of the C.B.D. in the retail hierarchy.

There is no evidence that the captive population within the C.B.D. is decreasing-in fact, the very opposite is indicated. Although employment figures are not available, an indication of increase is given by spatial statistics. The largest central city employer is the office function and office space increased by 2,833,817 sq. ft. between 1955 - 1966. It is considered unlikely that technological improvements in clerical work will have reduced office employment sufficiently to compensate for the increase in office activities.

Moreover, there is little evidence that the office function is decentralizing, although some traditional C.B.D. functions (wholesaling, warehousing etc.) are decentralizing or are decreasing in absolute terms. (See table 12.) These are mainly found in the frame of the C.B.D.

A further difference between the Cape Town and American situations is that one of the main factors causing decentralization in America - traffic congestion, which is literarily choking the centre of the city - is not yet a severe problem in Cape Town.

Therefore it can be concluded that although there is nothing to prevent decentralization from increasing at an accelerated rate (the two factors which make it possible - car ownership and brand standardization - are increasing), there is nothing to force this decentralization. The very fact that the rate of percentage suburban increase has been declining, although car ownership has been increasing, is an indication that the possibility of decentralization is not enough - it

must be forced before it will come about. In absolute terms the number of clothing stores in the suburbs will increase, but the ratio between centre and suburbs will probably level off fairly soon. The reason for this is that the nature of the centre is changing. An examination of Table 12 shows that convenience shops are decreasing in the centre, while shopping and luxury goods are increasing. Thus the C.B.D. is clearly emerging as the highest order centre, and is shedding many of its lower order functions, which are being picked up by suburban centres.

The metropolitan distribution of the increase in clothing stores will probably be similar to the pattern found today. Evidence discussed above in relation to the theory of Tertiary activity indicates that people are prepared to travel to established centres, and that stores within these centres increase at a faster rate than the threshold increase in their primary tributary areas. Thus the domination of existing centres will be increased.

This contention is borne out by an examination of Table 13, which shows the average annual turnover per square foot for clothing stores in various centres.

These statistics were collected by means of a questionnaire sample. Initial attempts to collect turnover figures revealed that shopowners were not prepared to provide this writer with the relevant statistics. Consequently, a questionnaire which attempted to solve this problem was devised. It was reasoned that :

(a) The main reason why owners were unwilling to provide turnover figures was that the information, when connected to a particular shop, was confidential.

(b) Shop owners in the trade had a very reasonable idea of turnovers generated by other shops in other areas.

Therefore, the metropolitan area was divided into a number of shopping centres and these were placed along one axis of the questionnaire. Along the other, clothing stores were sub-divided into mens', womens' and general categories and each of these categories was sub-divided into four size groups (under 500 sq. ft. - small; 500 - 1500 sq. ft. - medium - small; 1500 - 3500 sq. ft. medium - large and over 3500 sq. ft. - large).

Owners were then asked to fill in, for those shops which they knew, an "average" annual turnover per sq. ft. In this way, anonymity was guaranteed and the additional knowledge of shopowners was utilized. Results were disappointing for the survey yielded only a 23.7% return. The results, too, are biased towards the larger shops for, as expected, the larger, more aware forms were more inclined to furnish the required information.

However, a number of interesting trends emerge.

(a) Generally, the range of turnovers within centres is not large.

(b) Turnovers are remarkably consistant from centre to centre. Turnovers in the C.B.D. are generally higher than elsewhere, but when considering investment this must be weighed against higher land and labour costs.

For several of the firms interviewed, rental in the centre was as high as 14% of turnover, while in the suburbs it was consistently between 3 - 4%. General calculations on these figures indicate that the C.B.D. still provides a better investment than most suburban sites.

Turnover figures reveal that two suburban centres - Woodstock, Salt River and Parow - offer better investment returns than other centres. These figures are obviously affected by merchandizing techniques and other factors, but chain store branch statistics reveal the same trends. This writer believes that the assumption that merchandising techniques and the utilization of space does not vary greatly between branches of any chain store complex is a reasonable one. It is held, therefore that the pattern revealed in Table 13 is accurate.

For the other large suburban centres, the turnovers are very consistent. Thus no centre emerges as an obvious locational choice. The decision as to where to locate a suburban clothing store is not provided by turnover figures in this case, but would depend on the total population thresholds serving each centre and the number of stores within that centre.

For the smaller centres, many of which are found in lower income areas, turnovers are lower than in larger centres, and fluctuations are greater. The marginal nature of some of these establishments is clearly reflected in the very low turnovers found in certain Non-White areas.

(c) A consistent inverse relationship exists between size of the store and turnover per square foot. Interviews with a number of small shop-owners revealed that the opposite relationship was expected by them.

It would thus appear that the return on an investment is higher for smaller shops than for large, although total revenues are greater for the larger shops.

Thresholds

It is apparent that before a store should be located in any particular centre, the trade area of that centre should be delimited, total disposable income calculated and potential turnovers determined.

Methods employed in this type of analysis are discussed in Chapter 5. It would be useful, however; both from the planner's and the retailer's point of view, to have an indication of the average population and threshold required to support a clothing store. This figure has been calculated for Metropolitan Cape Town by means of Regression analysis.

The Method

The aim of the method is to calculate the value that might be expected for one set of data if some given value occurs in the other set. This could be done by separate calculations each time, but it is more effective to draw on a graph the line that represents the relationship between two sets of data.

In the case of a perfect positive correlation between two sets of data, individual values would be distributed along a straight line. Such a correlation is rarely found in a urban situation. At best there is some sort of relationship, but it is neither regular nor clear-cut. Thus the best that can be done is to insert a line that will give the closest approximation to the relationship at all stages. This is a 'regression line'. In obtaining the regression line by calculation, the principle is to ensure that the sum of the squares of the differences of the individual observed values from the line is at a minimum. Theoretically, it would be possible to calculate the minimum value for the sum of the squares by setting up the appropriate equation for each pair of values being considered. This is a lengthy procedure, however, and it is more convenient to apply a formula which gives the same result with much less labour. This formul a requires not only the correlation co-efficient, but also the average and standard deviation values for the two sets of data. The formula used may be written as follows :-

$$a - \bar{a} = r. \frac{\sigma a}{\sigma b} \quad (b - \bar{b})$$

Where the value a is unknown and the value b is known. In other words, the unknown value (a) differs from the average of its set a data ($\bar{a}$) by the same amount as the known value (b) differs from its average ($\bar{b}$) modified by :

(i) the ratio of the two standard deviations, which express the overall spread of values about their respective averages and

(ii) the correlation co-efficient which expresses the degree of actual relationship unit by unit.

In this study population was plotted against Number of clothing stores for each centre over 3 years, 1951, 1960 and 1969 (detailed data is given in table 14). In doing this, two main difficulties were encountered.

(a) Official population statistics are provided for areas which are unrealistic in terms of the retail pattern.

(b) In order to allocate population to shopping centres, tributary areas should be delimited, but this delimitation creates a great many difficulties (see below), particularly when applied retrospectively.

The data source used here is a recent population projection produced by the Regional Planning Department of the Cape Provincial Administration. [7] This source

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7. Greater Cape Town Region, Planning Report No. 2, "Population".

Cape Provincial Administration, 1968.

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has been preferred to others as it translates census population figures since 1951 into planning units and these spatial configurations are more realistic in terms of the retail pattern than magisterial or ennumerator districts.

The problem of delimiting tributary areas has been by-passed. This by-pass has been effected by combining planning units until a fairly natural breaking point in population distribution was reached. Thus no attempt to devide population between two centres on an arbitrary basis was made. For each planning unit cell within the grouped units which make up a "tributary" area, projections for 1969 were calculated by compounding given growth rates, and by utilizing all possible sources which give an indication of population within any area (i.e. consultant planning reports, market research reports etc.). The results are shown in Table 14, and the grouped "tributary" areas on Map 10.

The population statistics so derived and the numbers of stores per area were substituted in the formula by computer. The results obtained for the threshold level of the first store are :

1951	-	9,045
1960	-	8,906
1969	-	11,211

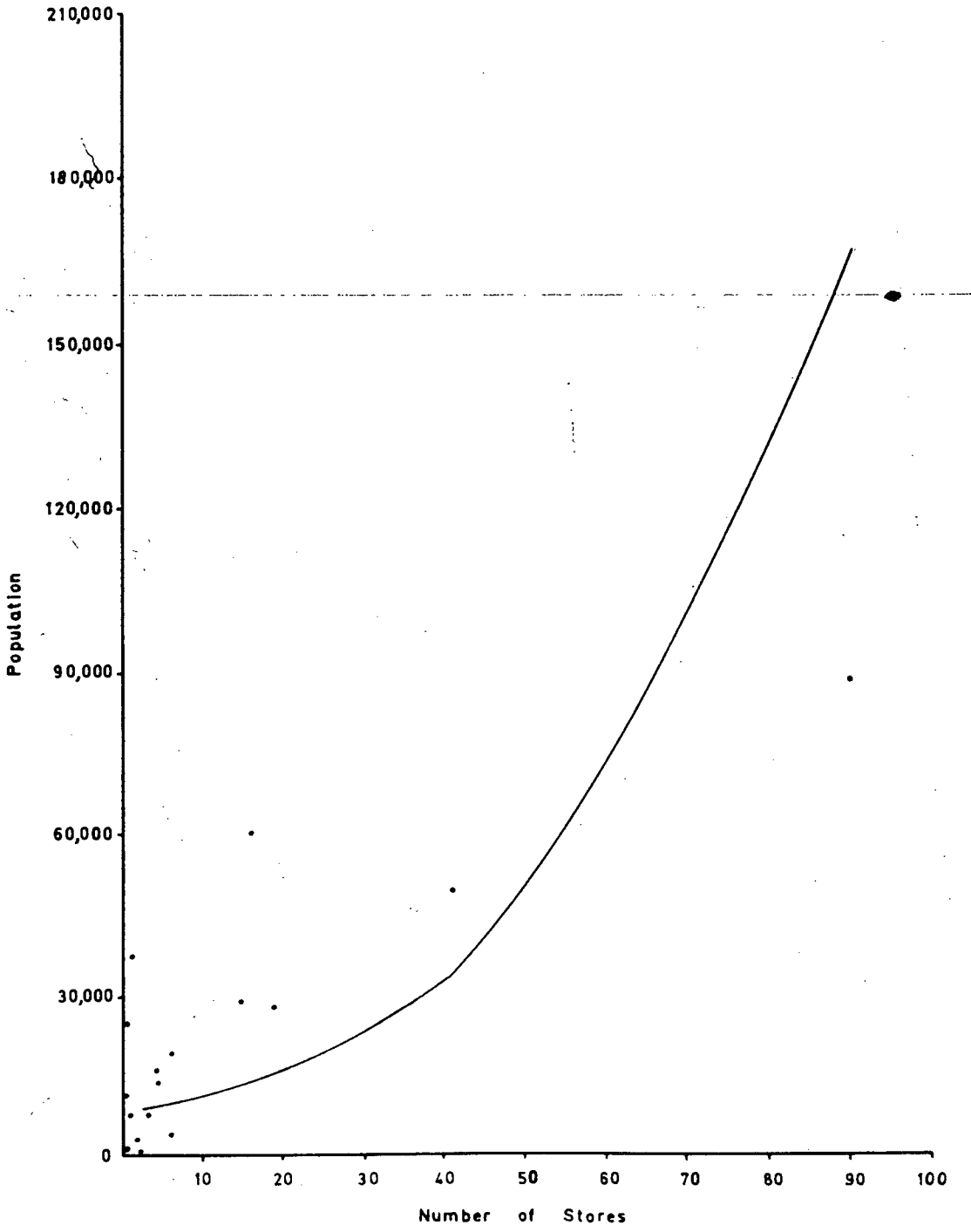
An examination of the graphs relating to this regression analysis is informative (graphs 3 and 4 - it will be noted that in the graphs the regression function is not straight line, but is parabolic. This is because the distribution of population tends to be lognormal. In calculating the regression line the log of the population was related to number of stores).

It can be seen that for 1951, and 1960 the scatter of points around the regression line was similar, and the fit of the curve is fairly good. In 1969, however, the threshold value has been forced upwards by a number of points which could be described as outliers. These points are, without exception, fairly newly established Non-White Townships, the shopping patterns of which have already been described. It is probable that an average figure for all race groups of 9000 people for the first store is reasonable.

In almost all cases, those points above the line represent lower income areas while those below the line are higher income centres. This is to be expected and merely proves that population figures should be weighted by income.

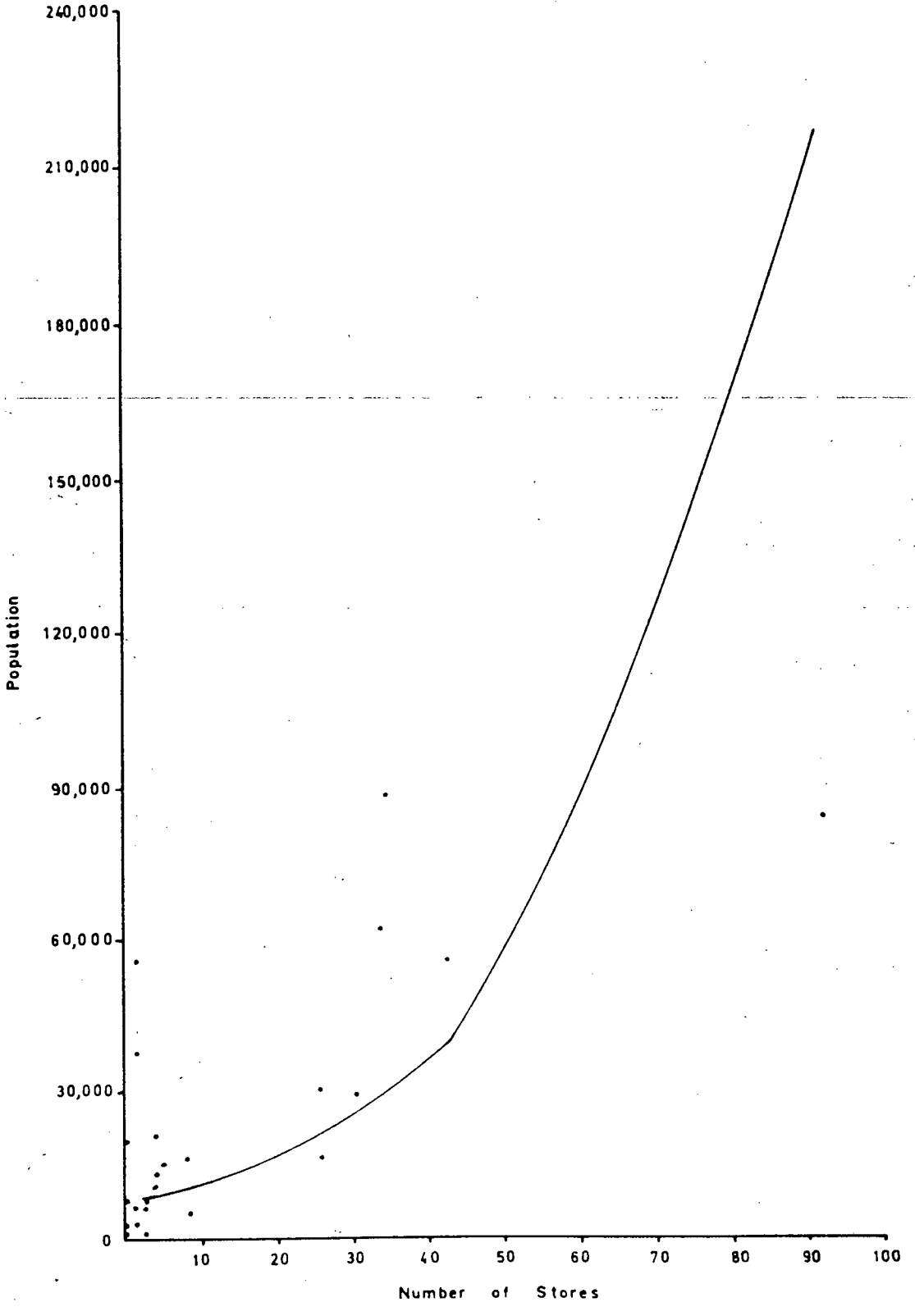
POPULATION THRESH-HOLD:- LEAST SQUARES

REGRESSION LINE - 1951



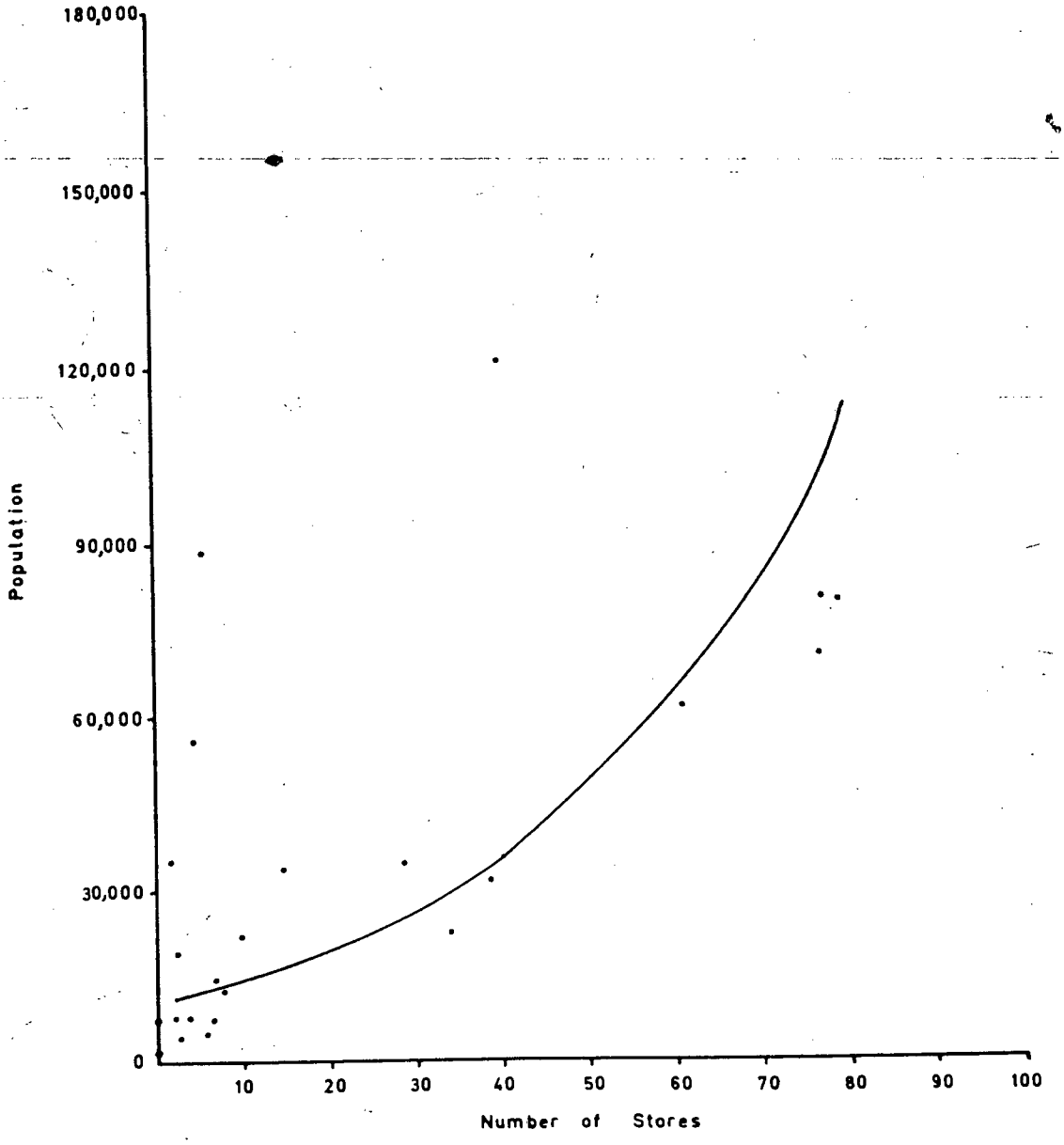
POPULATION THRESH - HOLD:- LEAST SQUARES

REGRESSION LINE - 1960



POPULATION THRESH:-HOLD - LEAST SQUARES

REGRESSION LINE - 1969



CHAPTER III

Micro-Analysis of the Location Pattern

The purpose of this Chapter is :

(a) To examine the growth of clothing stores within individual centres over time and to look for reasons for the locations chosen.

(b) To examine locational shifts within centres and to isolate reasons for these shifts.

Two methods have been used to achieve these aims.

Methods Used

The first method used to determine shifts over time is a simple one. The geographic centre of shopping areas has been used as a centre point from which to demarcate two minute walking circles. Each sector thus drawn has been declared a zone and for each zone the numbers of clothing stores as a percentage of the total number of stores in that centre has been calculated. The geographic centre has been used rather than the centre of gravity as the centre of gravity of a shopping centre is not constant over time. In fact, any point could have been used as long as it remained constant, and zones were of meaningful radius. The two minute walking intervals were not chosen arbitrarily. A survey which will be described elsewhere revealed that the average time spent walking by suburban shoppers in Wynberg was approximately 6 minutes. Consequently zonal divisions which were small enough to be sensitive to change and which were easily divisible into six were chosen. By dividing the areas into zones, it is hoped that shifts can be recognized and quantified, and the search for causality facilitated.

The Nearest Neighbour method or Point Pattern Analysis

The nearest neighbour method is essentially a measure of spatial distribution. The measure in its most elementary form[8] was developed in the field of plant ecology by Clark and Evans, but it has since been modified and elabourated for application in urban situations.[9]

8. Clark, P.J. and F.C. Evans. "Distance to Nearest Neighbour as a Measure of Spatial Relationships in Populations", Ecology, Vol. 35, 1954.

9. Dacey, M.F., "Analysis of Central place and point patterns by a Nearest Neighbour Method". The I.G.U. Symposium in Urban Geography, Lund 1960, p.p. 55 - 75.

Dacey, M.F., "A note on the Derivation of Nearest Neighbour Distances", Journal of Regional Science, Vol. 2, No. 2, 1960.

The central concept of Nearest Neighbour analysis is randomness. Where there is a complete absence of a systematic pattern of points in a specified region the distribution of points is called random.

In such a distribution, it is assumed that any point has the same chance of occurring on any sub-area as any other point; that any sub-area of specified size has had the same chance of receiving a point as any other sub-area of that size. Thus randomness as here employed is a spatial concept, intimately dependent upon the boundaries of the space chosen by the investigator. A set of points may be random with respect to a specified area, but decidedly non-random with respect to a larger space which includes the specified area. For meaningful results, therefore, the areas selected for investigation must be chosen with care. A pattern that is not random is either more clustered than random or more uniform than random. Nearest neighbour methods are used to measure the degree of deviation from random of any point distribution. By definition, complete randomness is the mid-point of a continuum of spatial patterns extending from complete clustering to complete uniformity.

In the simplest form measurements are merely taken to the Nearest Neighbour, and calculations made from these readings. This method, however, has the shortcoming that insufficient care is taken to ensure that points are allocated to particular distributions correctly. To overcome this, Dacey's modification takes each point, in turn, as a centre point. The circle surrounding each centre point, i, is divided into equal size sectors. The number of sectors is K and K = N. The K sectors are identified by k1, k2,..... k n. Let j indicate the Nearest Neighbour of i in any k sector and let jk indicate the Nearest j Neighbour of i in the k th sector. The straight line distance from i to j is called Dij. To avoid the use of subscripts, the specific Nearest Neighbour distances are written as Di1, Di2 ..... Dik.

The numbers identifying the k sectors are not randomly assigned. The numerical identification depends on the relative length of the Dik. The sector called ki contains the Nearest j Neighbour of i and this neighbour is called j1; the k2 sector contains the second nearest j neighbour, within sectors, of i and is called j2. The relations among the Dik's are, then, the following :

$$Di1 \leqq Di2 \leqq DiK.$$

It is important to remember that the distances are measured to the nearest neighbour within each sector and not necessarily to the K Nearest points. Each point in a distribution is an i point; it may, or may not, be a j point.

A sector mean distance is calculated by taking Nearest

Neighbour measurements from all, or a sample of, i points to the jk neighbours, summing the measured distances within each sector and dividing by the number of measurements. When there are K sectors, there are K means. The mean of the Nearest Neighbour distances for the K th sector is called $\bar{D}$ i k, where $\bar{D}\ i\ k = \sum_{i=1}^{i=N} Dik/n$, and 1, 2, ...k

In any specified region, however, many points occupy a border location and do not have a j Neighbour in each K sector. To satisfy this condition, distances may be measured to Nearest Neighbours lying outside the specified sutdy area, if this is possible. In this case, though, the observed mean applies to the points within the specified region and certain peripheral areas. The alternative is to reject the points from which K measurements to points within the area are not possible, and include only those points having a neighbour in each sector; then, however, the observed mean applies to only part of the specified region. Either resolution fails to provide a measure for the delimited area of interest.

The preferable solution is to include in the calculations the measurements from points which have K nearest neighbours. These calculations are representative of the region provided it can be shown or it is assumed, that there is no difference in the spatial patterns of the points occupying the border areas where less than K Neighbours occur, and of the points occupying internal areas where there are K Neighbours. This similarity of patterns can be verified by a chi-square test of the frequency of Nearest Neighbour distances from points having a border location.

As mean distances are used to describe spatial distributions, it is necessary to know that Nearest Neighbour distances are normally distributed. There are a number of tests for normalacy.

1. The graphic test using normal probability paper.

2. The Chi-squared goodness of fit test.

3. The Geary-Pearson test.

A further difficulty encountered in measuring is that it must be decided whether to measure from the centres of buildings or from their nearest walls. This problem, though purely procedural, is of vital importance, for results are often materially affected. For instance, if measurements were taken between two very large adjacent stores, readings would be dispersed if the centres of buildings were used, yet highly agglomerated if the nearest walls were used. In this study it was decided to use the latter, as it was felt that psychologically customers have arrived at a shop as soon as they encounter it's display windows. Moreover, distances used here are not "crow flight", but street distances.

The mean of measurements so taken provides a value for the observed average spacing between points. The mean distance to Nearest Neighbour that would be expected if the individuals of the population were randomly distributed is also calculated. The ratio of the observed mean distance to the expected mean distance serves as the measure of departure from randomness. The ratios that have been calculated for two or more populations are directly comparable with one another, as a measure of their relative departure from random expectation.

Thus the ratio $R = \frac{\bar{r}\ A}{\bar{r}\ E}$ can be used as a measure of the degree to which the observed distribution approaches or departs from random expectation, where $\bar{r}\ A = \frac{\Sigma r}{N}$ (r is here the distance in any specified units from a given individual to its Nearest Neighbour and N is the number of measurements of distance taken in the observed population or sample), and $\bar{r}\ E = \frac{1}{2\sqrt{P}}$ (P is the density of the observed distribution expressed as the number of individuals per unit of area - the unit of measurement used in the calculation of Rho must be the same as that used in measuring r).

In a random distribution, R = 1. Under conditions of maximum aggregation, R = 0, since all of the individuals occupy the same locus and the distance to Nearest Neighbour is therefore 0. Under conditions of maximum spacing, the mean distance to Nearest Neighbour will be maximized and will have the value $\frac{1.0746}{\sqrt{P}}$. When this is the case, R is normally about 2.15.

If the value of R indicates that a given population is not randomly distributed, the significance of the departure of $\bar{r}\ A$ from $\bar{r}\ E$ can be tested by the normal curve. The formula used in this test of significance is

$$C = \frac{\bar{r}\ A - \bar{r}\ E}{\sigma\ \bar{r}\ E}$$

where C is the standard variate of the normal curve and $\sigma\ \bar{r}\ E$ is the standard error of the mean distance to Nearest Neighbour in a randomly distributed population of the same density as that of the observed population. The value of $\sigma\ \bar{r}\ E$ for a population of density P is $\frac{0.26136}{\sqrt{Np}}$

The C values 1.96 and 2.58 represent respectively the 5% and the 1% levels of significance.

When two populations are being compared, it may not be sufficient to ascertain whether each of them departs significantly from randomness. One may also want to know whether the populations differ

significantly from one another with respect to the direction and magnitude of their departures from random expectation. The significance of the differences in the values of R for two populations can be tested by the Student - Fisher T distribution or by the F distribution.

It must be noted that far more sophisticated Nearest Neighbour models, dealing with more agglomerated and more random distributions, have been developed. These revolve around a modified Poisson function, but it was felt that the simpler forms were adequate for the purpose of this study.

The results obtained are shown on graphs 5 - 12, and table 15, but the interpretation of these results will be dealt with under the respective centres.

The Central Business District

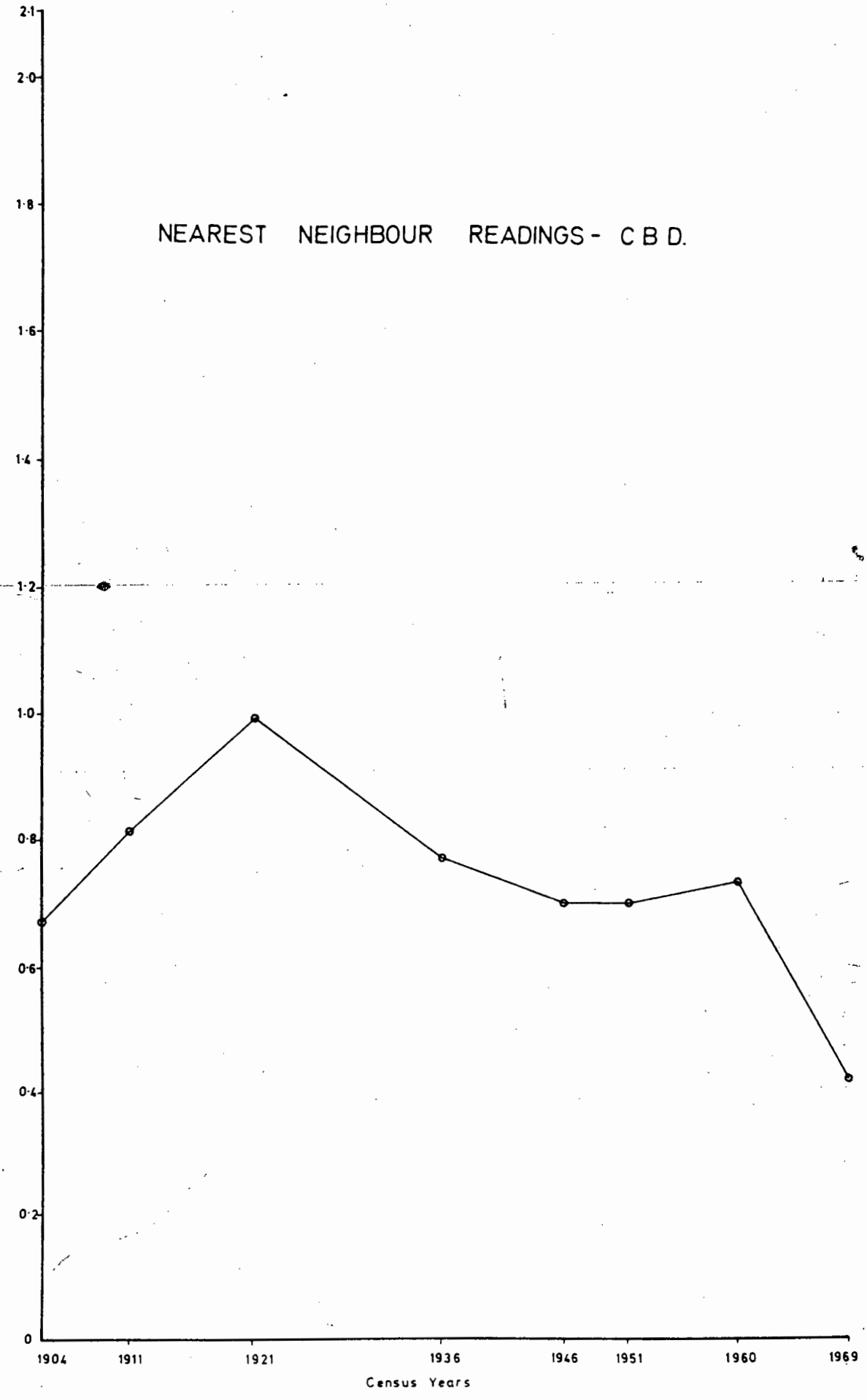
The pattern of clothing stores within the C.B.D. has been remarkably constant over time.

The pattern in 1904 was made up of five main forms.

1. A line along Adderley Street.
2. A line along Long Street.
3. A line down Waterkant Street.
4. A line down Caledon Street.
5. A cluster around Plein Street.

This pattern is logical in terms of population distribution and main transportation axes. Transportation media at this time were limited to fixed line systems and to feet and population distribution was concentrated around the C.B.D., in Sea Point and in the Southern suburbs. The fixed - line media in use were the train and the trolley-car or tram. The terminal for suburban trains located on Adderley Street while tram lines were laid along Waterkant Street (from Sea Point), Long Street (from the Gardens), Adderley Street and Plein Street (from Tamboerskloof - Oranjezicht). The Plein and Adderley Street lines were linked via Longmarket Street. Caledon Street was the main artery by which coloured pedestrians from District Six travelled to the centre.

An attempt was made to check the co-incidence of clothing stores and generators within individual clusters by reference to Juta's Street Directory. A problem was encountered in the definition of a generator. It was eventually decided that "Fancy repositories" was the closest equivalent to the Department and Variety Stores which are found today.


NEAREST NEIGHBOUR READINGS - C B D.
2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
1904
1911
1921
1936
1946
1951
1960
1969
Census Years

There appeared to be a general co-incidence between these distributions, but it was by no means absolute. In terms of main lines, the distributions were identical, but individual shops, by and large, do not seem to have located with respect to Fancy Repositories. The cluster on Waterkant Street, between Buitengracht and Bree Streets, had a Fancy Repository store at its core, but those stores at the bottom of Caledon Street were surrounded by butchers, grocers, greengrocers and a tailor.

In 1911 the pattern was very similar to that of 1904, but in 1921 a number of marked changes occurred. The Z shaped distribution along the main approach arteries still held but elsewhere the orientation changed from NE - SW to NW - SE. Dr. D.H. Davies found the same thing in his study of the C.B.D. (1957) [10] and he attributed the changing orientation to the motor car, which, he claimed, was becoming popular at this time. This hypothesis would

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10. Davies, D.H. Land Use in Central Cape Town, Longmans, 1965.

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seem to be valid. The only real clustering at this time was along Plein Street between Longmarket and Spin Streets. A more detailed examination revealed that the surrounding shops consisted of Jewellers, several Boot shops and several Tabacconists. The presence of major generators could not be detected.

In 1936 the basic pattern was the same as in previous years, but

(a) There was a tightening up around St. George's and Adderley Streets, particularly on the Wale Street side of Stuttafords. This is interesting as this area was predominantly taken up by Offices at this time.

(b) There was a tightening up below Adderley Street, particularly along Caledon Street where clothing shops almost entirely disappeared.

(c) A fairly intense clustering occured along Plein Street between Longmarket and Mostert Streets. The Cape Times Directory of 1936 reveals that this area was a specialist apparel district for surrounding uses were clothing manufacturers agents, furriers and shoe shops.

In 1946, 1951 and 1960 the pattern was very similar to that of 1936 except that in 1951 a noticeable shift occurred along Adderley Street from the Wale Street (office) side of Stuttafords to the Foreshore side. It is significant to note that both Markhams and Cleghorns, which are on the Foreshore side of Stuttafords, expanded during this period.

In 1969 the basic pattern was again the same. However, there was one main difference, and this was the general increase in activity on the Foreshore side of Strand Street. This increase has two particularly prominent manifestations :

(a) The arcades on either side of Waterkant Street between Burg and Long Streets. This increase can probably be accounted for by the increase in office workers in this area. In effect, shops are following the captive population.

(b) The infilling between the main generators of Garlicks, Stuttafords and Cleghorns along Adderley Street.

A further noticeable feature is the affect of two major generators, Ackermans and O.K. Bazaars on the clustering around Plein Street.

Thus since 1904 a number of minor variations in the pattern have occurred, but throughout the Z-shaped axes of Waterkant Street, Adderley and Plein Streets have remained dominant. Since the axes were clearly in operation in 1904, it was hypothesized that their dominance is due to public transportation termini which occur along them. To test this, the number of clothing shops occurring along these roads was calculated as a percentage of the total number of clothing shops in the C.B.D. Results are shown in Table 16. If the hypothesis is correct, the percentage of shops along these roads will decrease as car ownerships increases. The figures, which are remarkably consistant between 40 - 47%, clearly refute the hypothesis. This rejection is confirmed by the fact that although St. George's Street has become a major public transport terminus since buses replaced trams, it's increase in clothing stores has been minimal. Therefore, the conclusion is that these axes owe their importance to their suburban extensions, and that the type of traffic travelling along them does not radically affect their desirability as retail locations. This conclusion now raises the question of Strand Street - now that it has been extended as a through route, will it become a major clothing street?

An comparison of the C.B.D. boundary changes between 1957 (Davies)[11] and 1969 (Dewar)[12] reveals that although major

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11. Davies, D.H. Tbid

12. Dewar, N. A study of the Frame of the Cape Town Central Business District, unpublished Thesis, Geography department, University of Cape Town, 1969.

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extensions have occurred to the North-West and West, no change has been recorded along Strand Street (map 3). This factor is regarded as significant. The main C.B.D. function is retailing and evidence will be presented later in this chapter to show that the effect of a road as a barrier to shopper movement is dependent upon the width of that road.

It is the belief of the writer that the widening of Strand Street will serve to severe the C.B.D. into two parts in its upper reaches and to prevent Strand Street from developing into a major shopping street.

The shifts that have occurred in clothing patterns are clearly revealed in the Nearest Neighbour readings (Table 15 and graph 5). It can be seen that in 1904 the pattern was tending towards random. This tendency then increased until 1921 when the pattern was completely random. A normal test to see whether deviation from random was significant showed no significant deviation. From 1936 - 1960 the readings showed an initial slight agglomeration, and then a strong consistency. A student T test between these figures showed no significant variation. The 1969 reading, revealed a dramatic shift towards agglomeration. This pattern is entirely as expected. The move towards randomness between 1904 - 1921 reflects the growing popularity of the automobile and bears out, in statistical form, Davies' empirical observation that the orientation of the C.B.D. was disturbed by the advent of the motor car. However, the C.B.D., by definition, must have a certain tightness of structure and after the initial dis-orientation caused by the automobile, a slight tightening up occurred between 1936 - 1960. The degree of agglomeration during this period never reached the 1904 level, for the effect of the car was permanent. The dramatic agglomeration between 1960 - 1969 is indicative of a new phase in C.B.D. development. The C.B.D. is now undergoing a transformation whereby it is shedding its convenience functions and is emerging as a "shopping good" centre. (table 12 supports this contention and gives it some detail.) It is probable that the tendency towards agglomeration will continue but at a slower rate than before.

There is a statistically significant difference between readings for men's and women's stores (for these measurements, general stores were treated as both men's and women's stores). Women's stores show a greater tendency towards agglomeration than men's stores, and almost as great the total of all stores. The pattern on the map shows that although there is a tendency for shops of the same kind to locate together, this is by no means a hard and fast rule.

The quality pattern within the C.B.D. is interesting. Three main patterns clearly emerge.

(a) A low quality grouping around Waterkant Street.

(b) High quality in the centre, pivoting on Adderley Street.

(c) Medium quality below Adderley Street (around Plein Street) although this deteriorates steadily beyond Plein Street towards District Six.

This pattern led to the formulation of the hypothesis that the C.B.D. was made up of three different parts, all of which operated independently :

(a) The North-West section around Buitengracht Street (and, as far as clothes are concerned, particularly around Waterkant Street), which operates as a local centre serving the Malay Quarter and some of the captive industrial workers of the frame.

(b) The high quality core. Since the increase of facilities and range of goods in suburban centres has mainly occurred in White high income areas, it was hypothesized that this "sub-centre" mainly served white city workers.

(c) An area of great quality mix around Plein Street. This centre is predominantly supported by coloured consumers. As most coloured people are dependent on public transport, the C.B.D. remains the most accessible centre for them. Moreover, because of the total threshold size of the C.B.D. the range of goods is far greater than could be provided in any single low-income centre. It was therefore hypothesized that this sub-centre would mainly be patronized by special trip shoppers.

An initial pilot survey revealed that the clothing shops around the top of Waterkant Street were independent of the rest of the C.B.D., and that they did serve the Malay Quarter and the captive industrial worker population.

The patterns in the other "sub-centres" were more confused, however, and therefore a survey was constructed to test the hypothesis.

Two shops which were adjacent were selected in both sub-areas; in both cases, one was a men's shop, the other was a women's. In the Adderley Street sub-centre both shops had received a "first class", ranking in the quality survey discussed in Chapter 2; in the Plein Street sub-centre, both shops were "upper second class". Interviewers were assigned to these shops and on the first Monday, Wednesday, Friday and Saturday morning of August, they questionned every person entering the shop as to :

(a) Sex

(b) Race

(c) Had they come from a job in town before going shopping or were they going to a job in town afterwards?

(d) Were they special trip shoppers?

(e) If (d), was their place of residence Metropolitan (defined as the O 1 economic region), Regional (beyond the O 1 region) or local (the C.B.D., Gardens, Tamboerskloof, Oranjezicht, Vredehoek, District Six)?

(f) Had they made any purchases?

The results shown in Table 17 effectively refute the hypothesis postulated above. In both centres, the majority of shoppers were Metropolitan based. This was even more pronounced in the Adderley Street sub-centre than in that of Plein Street. However, the percentage of local shoppers was far greater in the Plein Street centre. This is undoubtedly due to the effect of District Six. In both cases the percentage of Regional shoppers was approximately the same. In both centres between 60 - 75% of the shoppers were special trip shoppers and in both centres the largest number of worker shoppers went to men's shops.

The survey, incidently, also revealed a number of interesting shopping habits. Although only women frequent women's shops almost half the shopping for men's clothing is done by women. This accounts for the very slight response of clothing stores to the movement of office functions. In almost all cases, those shops which have followed office movement have been boutiques, which are highly specialized and which are directed towards a well-defined market. It is therefore predicted that very little shift of clothing stores after office functions will occur.

It is interesting to see that the racial split of shoppers on both sides of Adderley Street was approximately the same for women, but very different for men. It appears that the Plein Street centre, with its reasonable quality, but generally lower prices, attracts the younger white girls (particularly office workers) while Adderley Street attracts an older set.

A marked difference between White and Coloured males is revealed. Generally White males show less tendency to "shop about" than Non-White males who are avid window-shoppers and who are very fashion conscious. This fashion consciousness is the reason why several qualtiy anomalies occur particularly in the higher reaches of Plein Street, where a high quality counterparts. Clothing for many is a status-symbol, just as furniture is for others. In both these goods similar anomalies appear, for some people in low-income groups are prepared to spend a large proportion of their income to purchase this status. It is interesting to note that often these clothing anomalies occur in close proximity to similar furniture anomalies.

It is concluded on the basis of the evidence presented above that the C.B.D. operates as a interrelated whole; that the "sub-centres" hypothesized above interact to a considerable degree and that the entire hypothesis formulated above is wrong.

The future pattern in the C.B.D.

Few changes are occurring which are likely to affect the pattern within the C.B.D. The only one which will probably be felt in the near future is the proposed substitution of the coloured population of District Six by a middle - income White Group. It has been shown above that an important part of the Plein Street centres'

trade comes from the local populace. As the per capita income increases in this local trade area the importance of Plein Street, which will remain in an interceptor position between the Station and the bus termini on the Grand Parade and the coloured industrial work nodes in the C.B.D. frame, will increase.

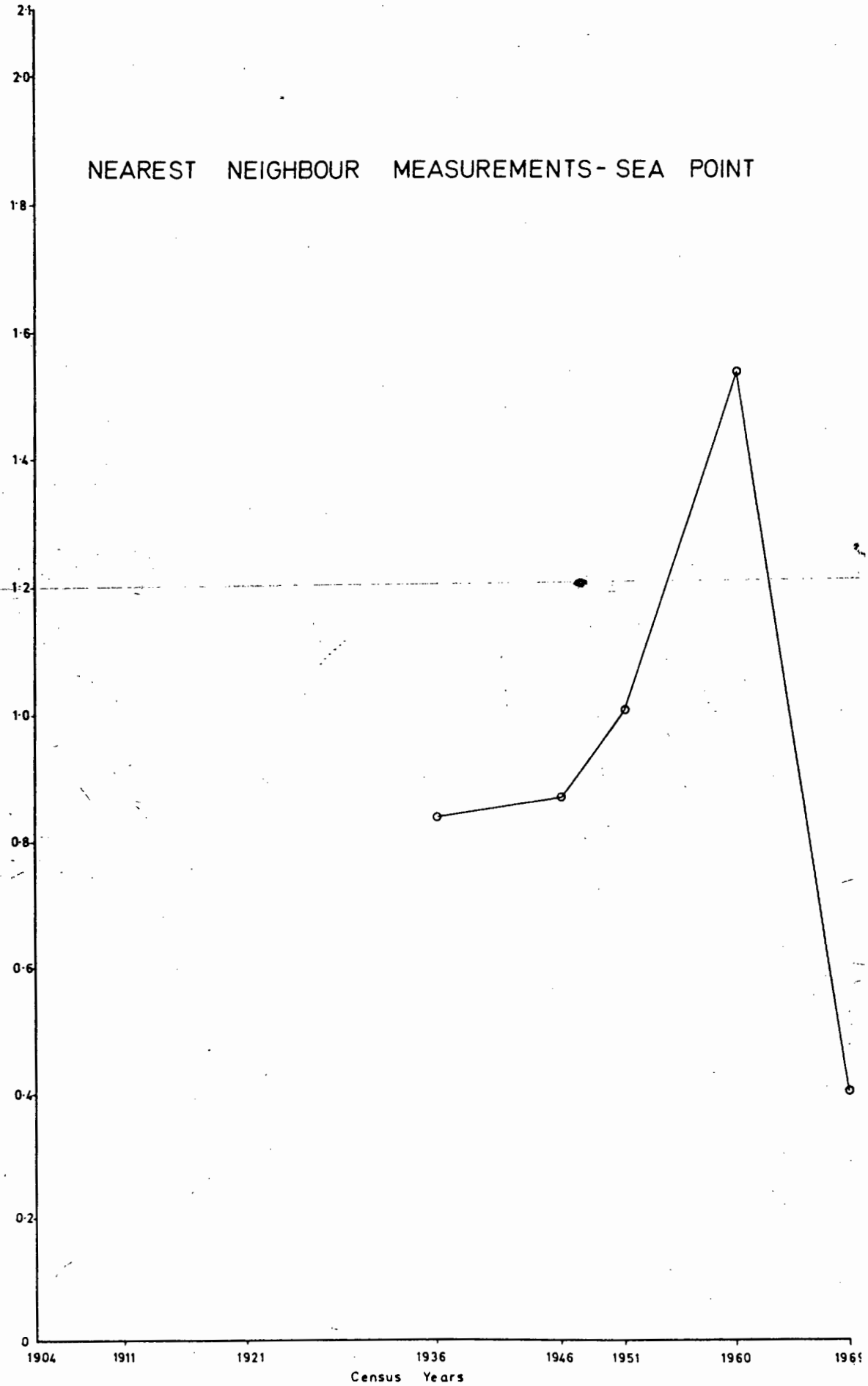
Sea Point

The pattern of development in Sea Point shows the transition from a shopping string to the inception of a shopping centre. Between 1904 - 1921 only one clothing shop was in existence. Nothing can be concluded from the location of this shop except that it was fairly central to the population distribution of the time. By 1936 the combined effect of increased thresholds and greater mobility caused by the increase in car ownership, led to an increase in the number of shops. The location of these shops was dispersed along the string. They located in relation to population spread and away from competitors. The influence of generators in this pattern cannot be detected, for all the shops were surrounded by grocers, butchers, launderies, tailors, watchmakers and boot repairers.

By 1946 a distinct cluster was beginning to form between Church and Clarens Roads (Table 18 and Plate 1), and by 1951 this cluster had intensified considerably. No reason could be found amongst the surrounding uses to account for this clustering. In addition a new cluster was forming between St. John's and Arthur's roads. In 1960 the basic pattern was the same - a fairly even spacing along the entire length of Regent and Main Roads, but with clustering between Church and Clarens Roads (this cluster had weakened slightly) and an intensified cluster between Arthurs' and St. John's Roads. It is significant to note that Woolworths opened opposite the latter cluster during this period. By 1969 this cluster had extended to Worcester Road.

Nearest Neighbour readings reveal a steady movement through randomness towards uniformity until 1960, when there was a sharp movement back towards agglomeration. This indicates that Sea Point is now developing a clearly defined structure over its previous pattern of random growth along a string. This statistical pattern is supported by quality distribution patterns and empirical observation. Throughout the entire length of the string, quality mixture is random. Empirically, it is difficult to see a centre of gravity for the centre, but it appears that there are two peaks or cores.

(a) The larger peak occurs at the intersection of Church and Main Roads where four large clothing stores, each situated on a corner (Pams, Truworths, Maxwell's and Foschini's) provide the generation. Observation indicated that the amount of interaction between these stores is great and that the barrier effect of Regent Road is slight (many people crossed the road, and not many of these bothered to cross at the traffic lights).


NEAREST NEIGHBOUR MEASUREMENTS - SEA POINT
2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
1904
1911
1921
1936
1946
1951
1960
1969
Census Years

(b) A smaller peak occurs between Arthur's and St. John's Roads and is focused on Woolworths Variety Store. Again, the Main Road does not form much of a barrier.

It is predicted that the structure of the centre will continue to tighten in the future and that, increasingly, shopping good functions will gravitate towards the generator peaks mentioned above.

Victoria Road, Albert Road (Woodstock and Salt River)

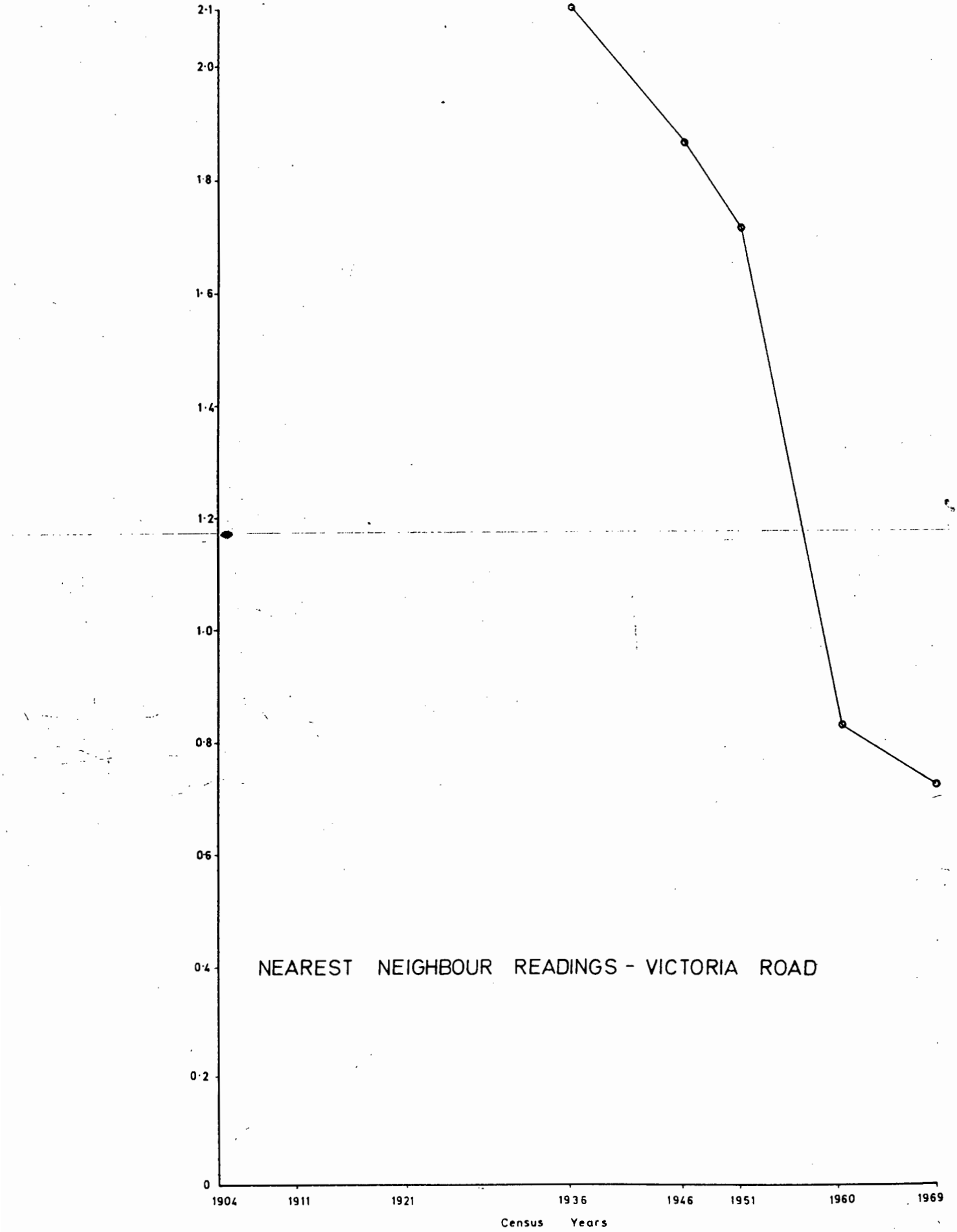
The general development of these centres has been similar, but in later years a number of important structural differences have appeared. For these reasons it has been decided to discuss the two centres together.

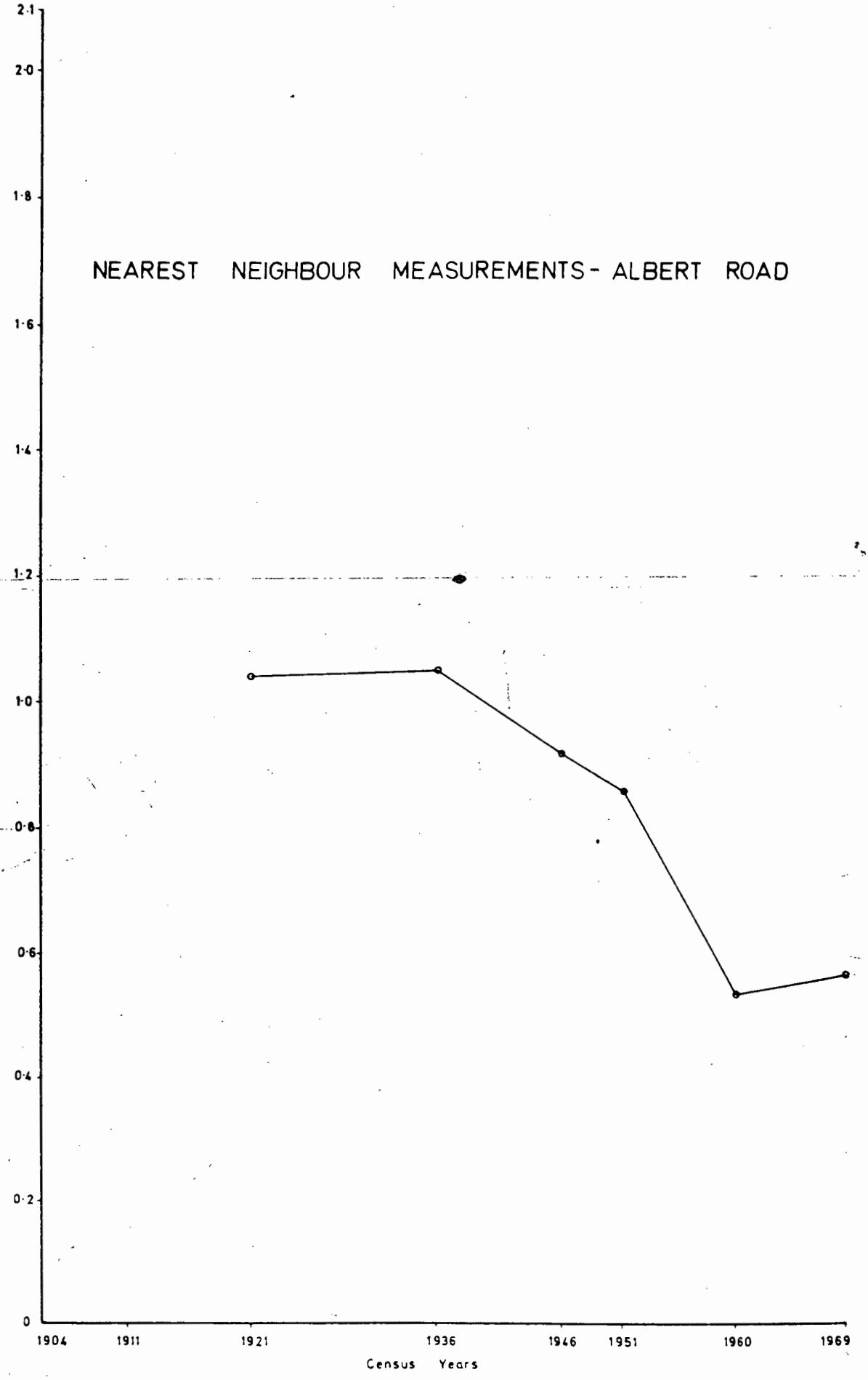
In both centres the initial locus of points was tied to public transportation media and clusters developed around Station and Junction Roads (it must be stated that the section of Albert Road referred to here lies between Voortrekker Road and Lower Main Road).

The rest of Albert Road is devoted to Manufacturing, Warehousing and convenience shopping of the lowest order. It is difficult to explain why this section of Albert Road developed more than the rest, but the reason probably lies in its intercept or position between the two important arteries of Voortrekker Road and Lower Main Road. This pattern was maintained until 1921 when shops began to spread down along the ar tery lines. A slight cluster developed on Albert Road, between Addison and Coleridge Streets. No reason could be found for this. Surrounding shops included a butcher, several boot-stores, a tailor, a greengrocer and a hairdresser. No major generators could be found. By 1951 the pattern was changing along Albert Road. The general dispersed pattern continued, but now a new cluster began to form between Voortrekker Road and Alfred Street. This was undoubtedly due to the interceptor position of this section of the artery between the bus routes from Lower Main Road and Voortrekker Road, the Station and the light industrial work-nodes along the rest of Albert Road. Along Victoria Road the pattern was the same as in previous years - general spread with slight agglomeration on either side of Station Road which forms the main pedestrian link between the Station and Victoria Road.

This pattern, formulated in 1951, has persisted until the present day; the only difference being a general tightening of the structure due to an overall increase in numbers.

In both centers, the location of clusters bears little relation to the location of Department or Variety Store generators, but can be attributed directly to accessibility of a more fundamental nature. The distribution of shops along Albert Road is less haphazard than along Victoria Road and its structure is more clearly defined.


2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
1904
1911
1921
1936
1946
1951
1960
1969
Census Years
NEAREST NEIGHBOUR READINGS - VICTORIA ROAD


NEAREST NEIGHBOUR MEASUREMENTS - ALBERT ROAD
2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
1904
1911
1921
1936
1946
1951
1960
1969
Census Years

Nearest Neighbour readings, without exception, confirm these patterns. (graphs 7 and 8).

The quality pattern in both centres is mixed (as expected in haphazard distributions), but less so along Albert Road than Victoria Road, However, shops of the same kind (men's, women's or general) show a marked tendency to locate together. It is unlikely that this is purely co-incidental; some premeditation is indicated.

Claremont

The development of Claremont shows marked differences from that of the centres already described. As population distribution is not very different from centre to centre, these differences must be ascribed to socio - economic factors.

The initial development of the centre was similar to that found elsewhere. Distribution was obviously affected by the location of the railway station, for all shops were located between Station and Newry Roads. In 1911 the outward extension of shops in an evenly spaced pattern suggests that population was increasing and that, similar to other centres, shops were following the population.

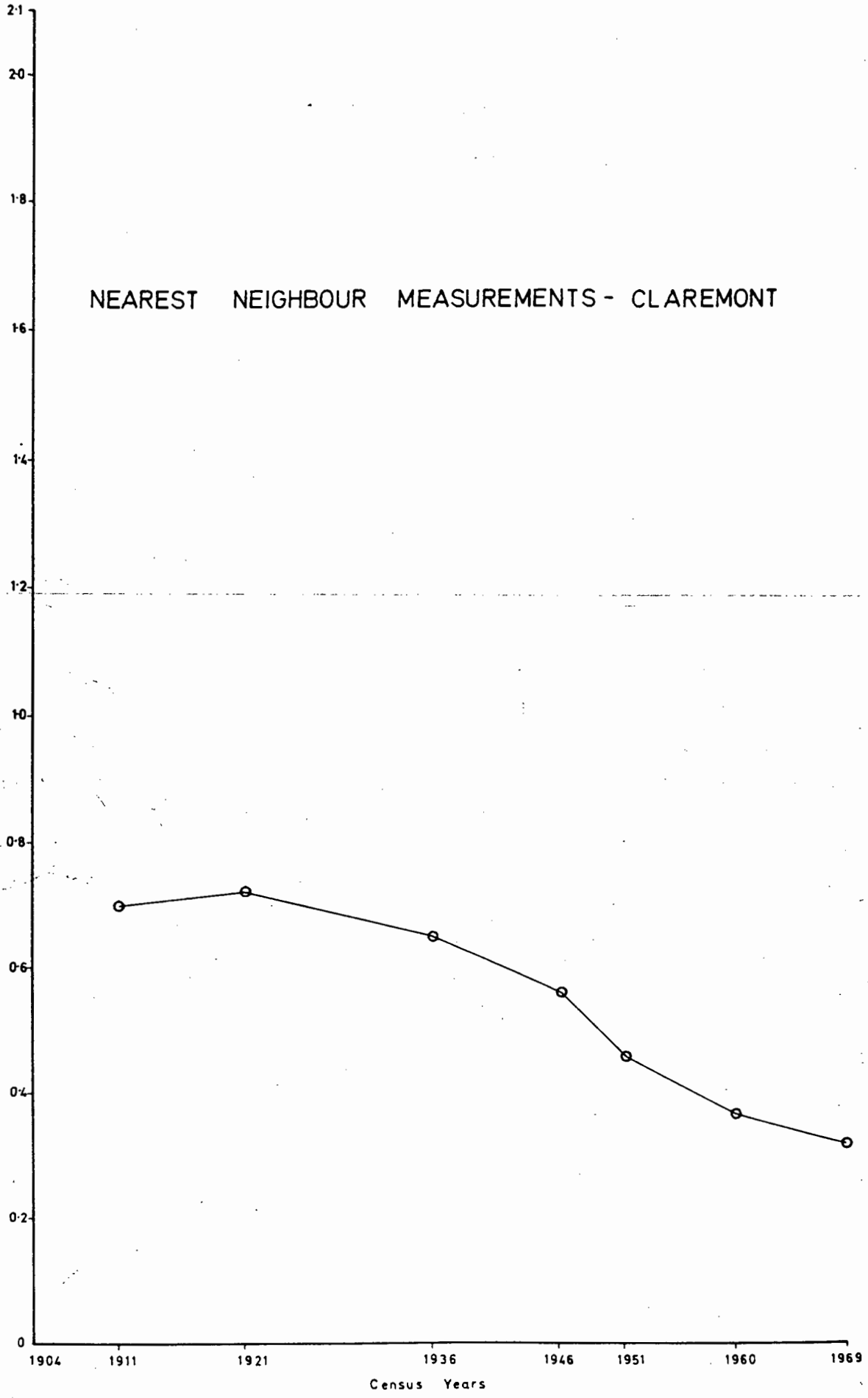
In 1921, however, the first signs of major differences appeared. In other centres at this time, the advent of the motor car drew shops outward along shopping arteries, but in Claremont the pattern was little affected. The only changes were increases in concentration between Obelisk Lane and Warwick Street and between Roscommon and Newry Streets. Again, the concentration cannot be attributed to any specific use or generator as the surrounding shops were made up of a furniture store, general dealers and fruiterers (Obelisk Lane - Warwick Street) and a Cafe, Tobacconist, butcher, boot store, fruiterer and Bank (Roscommon - Newry roads) respectively.

In 1936 the basic pattern was the same, but in 1946 a new, heavy concentration appeared between Vineyard Road and Draper Lane. No explanation could be found for this in the arrangement of uses. In 1951, however, the concentration between Stegman and Roscommon and Newry Roads was extended. This extension coincided with the appearance of Woolworths on the same side as the extension.

Between 1951 - 1969 the basic pattern did not change - the only differences were in extent and degree.

Nearest Neighbour readings portray the steady trend towards agglomeration. The range of readings is between 0.72 (1921) - 0.37 where 1.0 is a random pattern and 0.0 is complete agglomeration (Graph 9).

The explanation for the pattern, as suggested above, lies in the relatively high per capita income of the tributary population. Because of the higher disposable income, personal mobility is greater (higher car ownership rates, less women work, more use of servants etc) and consequently people tend to go to the shops and not vice versa. This facilitates a "tighter" centre and greater benefit from the advantages of agglomeration.


NEAREST NEIGHBOUR MEASUREMENTS - CLAREMONT
2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0
1904
1911
1921
1936
1946
1951
1960
1969
Census Years

The quality pattern shows a high quality core which falls away towards the edges. This is reflected both in structure and in consumer patterns. The core of Claremont consists essentially of consumer good stores; supported by whites or relatively wealthy Non-Whites. On the edges, however, convenience shops predominate and these serve a large but poorer tributary area.

Wynberg.

The pattern of development in Wynberg almost mirrors that of Claremont. Initial development occurred around Station Road (movement was limited to foot and fixed line media and thus there was a tendency for one cluster only to develop). By 1936 the inevetable spread which accompanied the motor car was in evidence, and the only clustering remained around Station Road. Surrounding shops consisted of a Watchmaker, a Jeweller, a Grocer and a Bazaar.

By 1946 the spread had increased. A new cluster appeared around York Road, but again no generator could be detected (Butcher, Grocer, Furniture Dealer, Cafe). Between 1946 - 1960 the cluster densities around Station and York Roads increased. O.K. Bazaars located here at this time and its affect can be seen. Although it attracted a few shops, it did not change the existing pattern to any marked degree.

Nearest Neighbour readings, which are very similar to those of Claremont, accurately record this movement towards agglomeration. (graph 10).

The quality pattern within Wynberg provides confirmation of the peripheral pattern observed in Claremont. So strong is this tendency that Wynberg, in fact, operates as two distinct centres.

(a) A fairly high quality core centre which provides a range of consumer, as well as convenience goods.

(b) A low quality, essentially convenience good centre on the Wittebome periphery of the entire Wynberg complex.

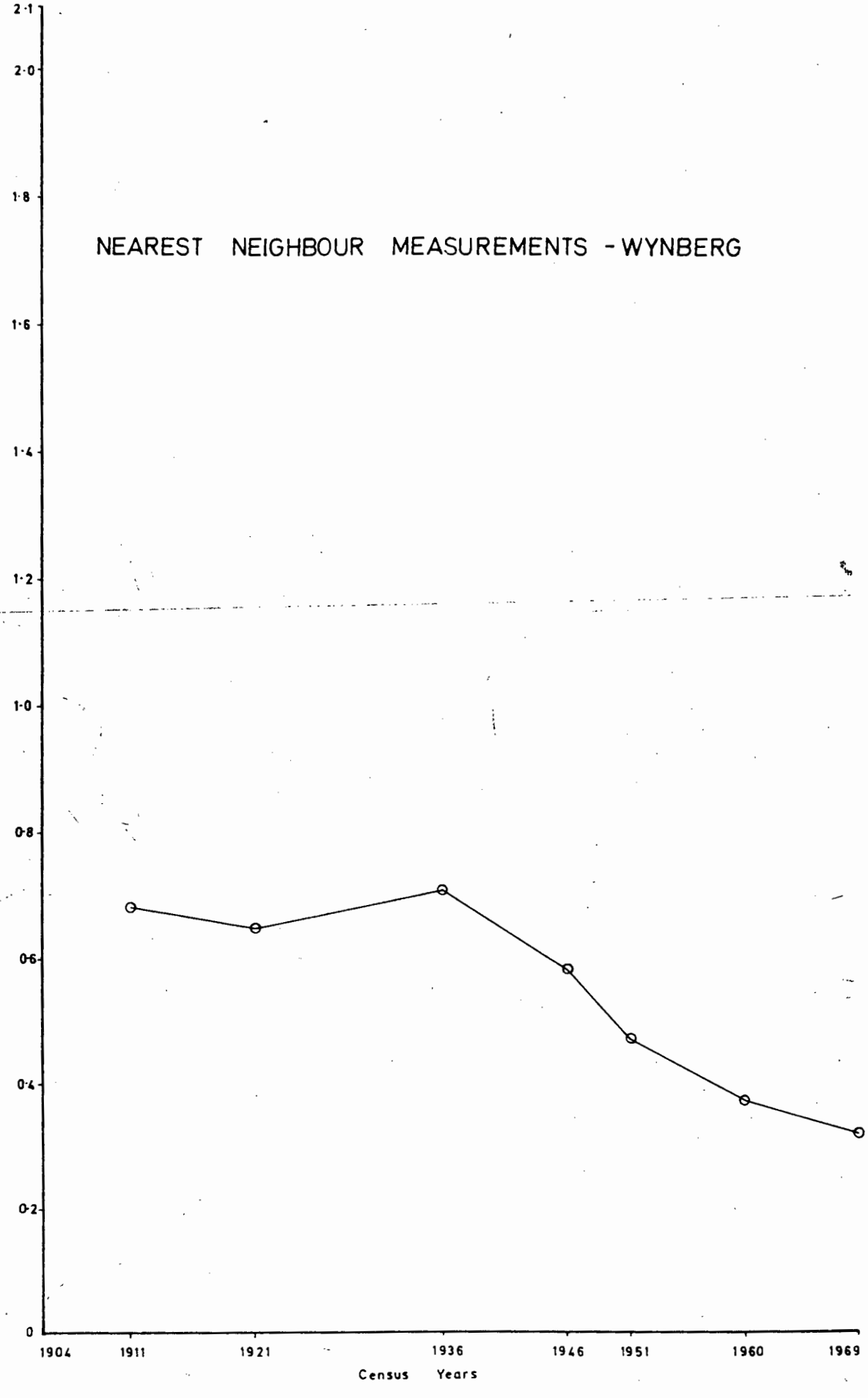
Fish Hoek

Fish Hoek reveals no characteristics which have not been discussed above.

The Northern Suburbs

Unfortunately, no information exists for the Northern suburbs prior to 1960. Probably the two most noticeable features about patterns in the Northern Suburbs are :

(a) The tendency for large, modern stores (often local branches of chain store complexes) to locate together in clusters. This tendency is probably more noticeable here than elsewhere because the relatively late development of these shopping complexes has enabled greater freedom of locational choice for stores.


NEAREST NEIGHBOUR MEASUREMENTS - WYNBERG
2·1
2·0
1·8
1·6
1·4
1·2
1·0
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0·4
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1904
1911
1921
1936
1946
1951
1960
1969
Census Years

(b) The operation of the centre itself. In Goodwood, Parow and Bellville significant differences occur on either side of Voortrekker Road. The Northern side of the road operates as a higher-income centre than the Southern side of the road which serves a predominatly coloured and low-income white population. The most significant feature of the difference is that the two sides of the road operate completely independently of each other. Both sides have centres of gravity, which are usually indicated by increases in pedestrian activity and improvements in the quality pattern, and a range of quality but the amount of interaction across the road is negligable.

This can be seen from the quality pattern. In Goodwood, the quality core of the low-order centre is directly opposite some of the lowest quality of the higher income centre. Similarly, in Bellville the centre of gravity of the higher-income centre revolves around Durban Road where a number of large clothing stores have located together in two Arcades. The lower income centre also revolves around Durban Road, but here the major generator is the O.K. Bazaars and the amount of interaction between the two sets of generators is minimal.

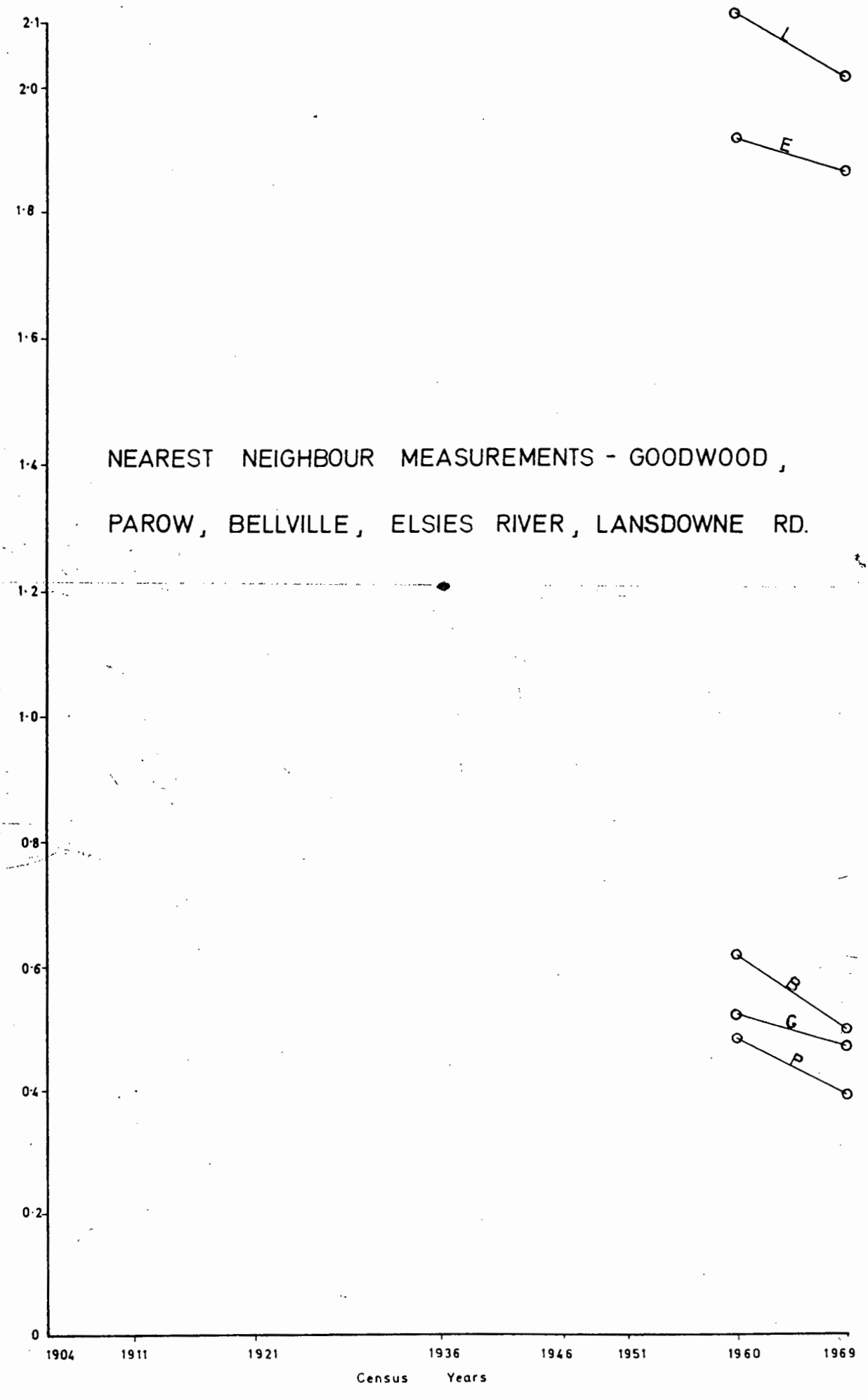
The implication of this observation is that Voortrekker Road is a serious barrier to shopping movement. Since it was observed that Main Road (Southern Suburbs), Regent Road and Main Road (Sea Point) and Victoria and Albert Roads, did not form a similar barrier, the conclusion drawn is that the barrier effect of a road on shopper movement is directly related to its width and/or the speed of traffic travelling along it.

Unfortunately, a shortage of time prevented the quantification of this observation (except in Wynberg - See Chapter 4), but it could be accomplished. Workers, placed at strategic points on both sides of the road, should "pick-up" and follow shoppers, recording their movements. The number of times shoppers crossed the road expressed as a percentage of the total number of trips observed would serve as a measure of the barrier factor. A further refinement could be added by weighting the factor by the number of times crossings occurred at traffic lights. It is suggested that the measurement of the barrier effect of roads and their impact on shopping centres would provide fruitful and valuable material for researchers in the future.

Conclusions

A number of conclusions have been drawn from the above observations on the development of shopping centres in Cape Town.

(1) The structure of centres is linked to the mobility of people; this mobility, in turn, is intimately dependent upon income and car ownership rates. It has been shown that in poorer areas, shops tend to follow the people, while in higher income areas, people follow the shops. To test this hypothesis conclusively, Nearest Neighbour readings were calculated for the distribution of clothing stores in two coloured areas - Elsies River and Lansdowne Road. The results are shown in Table 15 and graph 12; for both centres readings showed an almost uniform spacing.


NEAREST NEIGHBOUR MEASUREMENTS - GOODWOOD, PAROW, BELLVILLE, ELSIES RIVER, LANSDOWNE RD.
2·1
2·0
1·8
1·6
1·4
1·2
1·0
0·8
0·6
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0·2
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1904
1911
1921
1936
1946
1951
1960
1969
Census Years
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P

This finding is highly significant and throws serious doubt on the policy of developing shopping centres in poor, Non-White areas. The uniformly spaced pattern is partly, but not entirely attributable to economic factors. The mobility of the Non-White shopper is also severely restricted by socail factors. Family size is an important component of this, for the housewife, who is the main shopper within the household, cannot leave many children unattended in the house at any time. Moreover, she does not have the capital to "stock-up" with goods during any one shopping expedition.

Consequently, she is obliged to slip out and do her shopping in the shortest possible time (particularly for convenience goods - it is strongly suspected that the pattern for convenience goods will be even more uniform that the consumer - good pattern)

The pattern of shopping which has developed in Non-White areas is a reflection of the socio-economic status of the people. To ignore this is bad planning. It is no use changing the shopping habits of the people until they are giving the mobility of the group whose patterns are being forced upon them.

2. Indications from this study have been that the locations of large generators have had little influence on the pattern of clothing retailers; that there is a general co-incidence between the locations of the two; but that this is because both tend to locate in the most favourable areas with centres. Closer examination reveals that, while this is generally true, in almost every case large clothing stores (particularly those which are branches of chain stores) have located in close proximity to Department and Variety Stores. The conclusions from this are, firstly, that only these stores are sufficiently alert to actively persue this policy and, secondly, that these stores have larger resources behind them and consequently greater bargaining power. Therefore they tend to monopolize the most favourable locations. It is held here that these large stores provide a better indication of the locational forces in operation than the general pattern, for smaller owners operate almost entirely on an intuitive hit-or-miss basis. In the long term the pattern which emerges by this means is a reasonable one, but at any point of time aromalies occur.

C H A P T E R 4.

A study of Sequences

The initial field survey and research utilizing the Juta's and Cape Times Directories indicated that locational relationships seem to exist between clothing stores and certain other shops. However, it is impossible to be certain about this through subjective observation alone. There is always a tendency in empirical study for the occasions on which the relationship being examined occurs to leave a greater impression than those occasions on which it does not occur. Therefore, it is necessary to test the suspected relationship statistically. Preliminary research on the measurement of sequences along a line has been conducted by Getis [13]. It must be emphasized

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13. (i) Getis, A. "A method for the study of Sequences in Geography", Transactions of the Institute of British Geographers, 1967. (ii) Getis, A. and J.M. Getis, "Retail Store Spatial Affinities" Urban Studies, 1967.

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that these are preliminary studies only. Little work has been done on this elsewhere in the world. It was decided that great advantage could be derived by measuring these relationships. Existing economic theory (Christaller, Berry, Haig, Isard) helps to explain the forces operating to shape commercial zones of cities and the broad spatial patterns which are the result of interacting economic forces; the theory is unable to explain or account for the particular location of the individual firm. It is suggested that the affinity of stores to other stores is one factor affecting the precise locational pattern. Therefore it was decided to apply the method to clothing stores within the shopping centres of Metropolitan Cape Town.

The Method

Assume a sequence of elements distributed along a line in the following way : C A B G C E G F A B C C B A C G F A B A

Each of the letters represents a specified kind of element. All A's are alike, All B's are alike and so on. There are a A's, B b's .....g G's. The sum a + b + c + d + e + f + g = n. Let X be the number of times that a B follows an A in the sequence, and let X be designated a random variable. The value of X depends on the way in which the sequence is arranged for it could take on any value from 0 to 4. The lesser of a or b (min (a,b)) determines the upper limit of X. In general, then, X is a random variable that can take on values 0, 1,..... min (a,b). In order to determine whether B's follow A's more times than can be attributed to chance, the probability distribution of X must be calculated.

According to the theory of permutations and combinations, a group of n distinguishable elements can be arranged in n! equally likely arrangements. If, however, these n elements are divided into groups of a A's b B's ..... g G's, then there are $\frac{n!}{a!\,b!\,c!\,d!\,e!\,f!\,g!}$

equally likely arrangements. The number of combinations which give 0, 1, 2, 3, 4, A B links must then be calculated. For convenience, call all elements that are not A's or B's the letter C. In any arrangements there are X, (a - C), (b - X) and C groups of elements. To ensure exactly X A B's, all elements except for the a - X A's are arranged first. This can be done in

$$\frac{(X + (b - X) + c)!}{X!\ (b - X)!\ \ c!} \qquad (1)$$

ways. The remaining a - X A's can be placed before any of the c C's or before any of the already placed X A's. This results from the fact that if a remaining A was placed before a B, the number of A B's would be altered. Therefore, there are two groups of elements - (a - X) and (c + X). These can be arranged in

$$\frac{\left((a - x) + (c + x)\right)!}{(a - x)!\ \ (c + x)!} \qquad (2)$$

ways. Taking (1) and (2) together, they can be arranged in

$$\frac{(x + (b - x) + c)!}{x!\ \ (b - x)!\ c!} \cdot \frac{\left((a - x) + (c + x)\right)!}{(a - x)!\ \ (c + x)!} \qquad (3)$$

ways. Therefore, of the $\frac{n!}{a!\ b!\ c!}$ equally likely arrangements, the value of (3) gives exactly X A B's. Since $\binom{u}{v}$, the binomial co-efficient, can be written as $\frac{u!}{v!\ (u - v)!}$ the above statements can be written in terms of combinational co-efficents as

$$\frac{\binom{b}{x}\binom{n - b}{a - x}}{\binom{n}{a}}, \quad X = 0, 1, \ldots\ldots, \min(a, b) \qquad (4)$$

The form of this distribution is hypergeometric. The mean is $\frac{a\ b}{n}$ and the variance about the mean is given by $\frac{a\ b\ (n - b)\ (n - a)}{n^2\ (n - 1)}$ (5)

For most practical urban problems it will not be the distribution of elements which is needed as much as the test for significance. By using the formula $\frac{L - E(L)}{\sigma(L)}$, the values of the hypergeometric distribution can be transformed into normal variates. L is the observed number of A B links, $E(L)$ is the mean $\binom{a\ b}{n}$ and $\sigma(L)$ is the square root of the variance.

The distribution described above consider one element, following another, such as B's following A's. However, for the problem at hand, the fact that a B comes before or after an A makes no difference. What is important is that a B is next to an A.

In order to obtain the probility distribution which describes the random variable associated with A B or B A links, a more complicated procedure is necessary. The complications are due to the fact that, even though the expected number of A B's equals the expected number of B A's, the probability distribution of their joint probabilities is disturbed by the

possibility of arrangements of A B A's in the sequence. This means that B is considered as part of two different links.

Getis handles this contingency in the following way. "Let X be the number of A B A blocks and let Y represent the numbers of A B's or B A's when some letter other than A or B comes after and before theB's respectively. The number of adjacencies is 2 X + Y. The probability distribution of a possible combination of X, Y is

$$\frac{1}{\binom{n}{a,b,c}} \sum_{w} \binom{a-1}{w-1}\binom{c+1}{w}\binom{a-w}{X}\binom{2w}{Y}\binom{b+c-w}{c-w+x+y} \quad (6)$$

The limits for W are determined by the sense of the combinatorial co-efficients, that is, the value of the above formula is determined by summing after all possible integers for w are used one at a time.

It is easy to see that the mean number of adjacencies is $\frac{2ab}{n}$

The variance has the form

$$\frac{(2ab)(2ab + n(c-1))}{n^2(n-1)} \quad (7)$$

" 14

14. Getis, Transactions of the Institute of British Geographers, op cit, p. 90

The Method applied

A. Procedural Problems:

The first problem encountered was the definition of a link. This may be defined as a connection between two next-door neighbours or two next-door-but-one neighbours, or any other arrangement that makes sense. Getis claims that "the investigator must be prepared to test various definitions before becoming committed to one." 15

15. Ibid, p. 91

The inference here is disturbing - that the most acceptable results determine the definition of the variable. This obviously negates the objectivity which is the entire purpose of the technique and is completely unacceptable. A link must be defined in terms of locational significance and the definitions must be accepted before results are interpreted. What, then, is a significant spacing between shops? In order to determine this a survey was conducted in the Wynberg Main Road shopping centre. (Wynberg was chosen as this centre encompasses a greater variety of patterns within a limited area than any other centre. This is because of the wide disparity of incomes within the tributary area).

Workers were placed along the entire length of the centre at predetermined points. Points were determined on the basis on transportation. Local terminii (bus stops, the station, parking areas and parking meters) were chosen. From these points, research assistants followed shoppers and recorded their movements on maps and on cards. The measurements given below are compiled from these readings. A total of 64 shoppers were followed.

	Total Time Spent	Time in shops	Time walking	Distance walked	No. of shops visited	No. of shops passed between visits	Total No. of shops passed	No. of times Main Road was crossed per visit	No. of times crossing occurred at lights
;an	21.5	15.7	5.8	310.2 yrs.	2.3	3.5 ⁑	15.5	1.0	63%
;andard viation	1.87	1.4	0.8	43.7	1.08	1.7	4.2		

⁑ The average number of shops passed ignoring the walk to the first shop is 2.3

As the purpose of the survey was primarily to show the average number of shops passed between visits to shops, the most significant finding is the 2.3 reading. On the basis of this, a "link" was defined as a spacing of two shops.

The figures also provide interesting insights into shopping patterns within the centre.

(1) Out of an average total shopping time of 21.5 minutes, only 5.8 minutes were spent walking. The inference is that the social, "strolling-about" aspect of the Wynberg shopping centre is not developed. People, in fact, know what they want to do and they do it in the shortest possible time. Window-shopping and other time-consuming persuits are not prevalent. This pattern is supported by the verbal reports of interviewers. Shoppers generally walked fairly quickly to their destinations and then left the centre immediately. In several cases, husbands dropped their wives at one end of the street and then drove their cars to the final shopping destination where they waited for their wives to rejoin them. It would be interesting to compare these figures with statistics compiled for the C.B.D. It is suspected that the average time spent walking in the C.B.D. would be longer and that the walking rate would be more leisurely and punctuated by more frequent stops for window shopping etc. The total shopping time would probably also be greater.

(2) The barrier factor of the Main Road, measured by the technique suggested in Chapter 3 would be 0.63.

$$\frac{\text{Number of times the road was crossed}}{\text{total number of visits}} \times \% \text{ Number of times the crossing occurred at traffic lights}$$

In this example $\frac{64}{64} \times 0.63 = 0.63$

B. Technical Problems

A computer programme was written to implement the technique of sequential analysis discussed above. The programme, which was written in M A C, proved more lengthy and difficult than was at first anticipated. A number of major statistical difficulties were encountered.

1. It was found that in fact the definition of a link could not be extended without deriving a new statistic. The basic problem is an extension of the AB or BA question, in which difficulties are encountered through the introduction of an ABA seque ce. By extending the definition of a link, the relationship between the number of adjacencies and the number of A's or B's changes. Thus A B A A and A B A B form the same number of A B adjacencies, if a gap of one shop or less is regarded as significant, although their distributions are different (the number of A's and B's in the distributions vary). This problem is not insurmountable, but it would require a competent statistician to solve it. As time was limited, it was decided to restrict the definition of a link to immediate adjacencies.

2. The statistic (6) derived by Getis is incorrect in one important respect. In initial computer runs it was discovered that whenever shops of the same kind occurred together (i.e. AA or AAA termed C in statistic (6)) probability readings were incorrect. The reason is that the $\frac{1}{(a, b, c,)}$ function is incorrect and should read $\frac{1}{(a, (n - a),)}$ Consequently, it is impossible in the statistic derived by Getis to develop a value for C. Work is proceeding on this. A short-term procedural solution was devised for the purposes of this study. Data was merely given a different nomenclature and thus treated as an A B or B A link. Thus in the run to test men's clothing with men's clothing, the category men's clothing was given two dummy numbers (in other runs, men's clothing retained its original number) and thus the test was the same as a simple B A or A B test.

3. A limit exists on the total number of sequential elements which can be handled. This limit is set by the factorial function and its value depends on the size of the computer available. It was found that for the I.C.T. 1301 this limit occurred between 60 - 70 elements. The effect of this limitation on the problem at hand was not great, for fairly obvious breaks occur within shopping centres and thus sub-divisions are both easily constructed and are meaningful. All breaks were designed to correspond with "dead-space" gaps of at least 200 ft. It was felt that for distances greater than this, adjacencies did not exist.

It can be concluded, therefore, that the method has merit, but that there are a number of procedural difficulties to be overcome. These do not appear to be insurmountable, and the final result should justify the effort.

Results

The result of the analysis are presented in Appendix A and a

synopsis of the significant results in tables A and B.

A number of interesting points emerge.

(1) The total number of significant readings is not high. This could be attributed to several factors.

(a) That, in fact, there is no advantage in locating in physical proximity to the shops tested here; or if there is advantage, its' effect is not strong enough to influence the location pattern.

(b) That the definition of a link used here is totally unrealistic and that it camouflages significant affinities which do occur. It has been shown above that the most realistic definition of a link is two shops. It is unlikely that the extension of the defined link from one to two shops would radically affect the results.

(c) That the pattern existing at any point in time does not reflect the locational forces in operation at that time. This is probably partly true. In examining the pattern of development over time, it has become apparent that the time factor is vital in location. Location patterns emerge as a result of trial and error. In several cases (and men's clothing stores in Rondebosch is an example of this) it was noted that stores try a particular site and go out of business soon afterwards. Some time later, another store tries the site and the same thing happens. Eventually, however, a store will try the site when the time is right, and it will succeed and remain. In this way a pattern emerges. As conditions are constantly changing with time, however, this pattern is never optimized, for the process by which change is implemented is slower than the rate at which conditions change. The objective of a study such as this is to shorten the process of change by reducing the trial and error mechanism.

From the above it can be concluded that the real advantage of a study of this nature can only be reaped over time. It is the changi patterns or developmental trends which will provide the greatest insight into the process of retail development and thereby facilitate decision - making. This study, then, is regarded by the writer as the first stage of a series of analyses designed to increase our knowledge of the structure (and changes within the structure) of shopping centres and to improve and enlarge the platform from which decisions are made.

It is probable that the existing pattern is a combination of (a) and (b). From this, the second conclusion is drawn.

2. The existing pattern, to a degree, reflects location forces. Until sequel studies are conducted there is now way of knowing whether or not these forces are changing. It is reasonable to conclude, however, that the results presented here do indicate those affinities which have the best chance of succeeding in metropolitan Cape Town at the present time.

SIGNIFICANT AFFINITIES BY SUB-CENTRE

TABLE A

Use code		type
Sea Point	:	Marais Road - Arthur's Road
7 - 22		Women's clothing with chemist
30 - 26		Clothing with dry cleaning
71 - 72		Clothing with clothing
Sea Point	:	Clarens Road - St. Andrews Road
7 - 24		Women's clothing with hairdressers
30 - 12		Clothing with furniture, hardware
Victoria Road, Woodstock	:	Trafalgar Park - Walmer Road
71 - 72		Clothing with clothing
Albert Road	:	Voortrekker Road - Junction Road
7 - 11		Women's clothing with soft goods
51 - 52		Men's clothing with men's clothing
Albert Road	:	Junction Road - End
51 - 52		Men's clothing with men's clothing
30 - 10		Clothing with shoe shops
Claremont		Right Hand side (from Wynberg). Wynberg e
7 - 17	:	Women's clothing with Jewellers
Claremont		
7 - 17	:	Women's clothing with Jewellers
Claremont	:	Left Hand side (from Wynberg) - C.B.D. si
7 - 20		Women's clothing with florists
30 - 26		Clothing with dry cleaners
Wynberg		Wetton Road - Piers Road
8 - 20	:	Men's clothing - florists
41 - 42		Women's clothing - Women's clothing

Use code		Type
Wynberg 71 - 72	:	Piers Road - Grosvenor Motors Clothing with clothing
Wynberg		Opposite Blenheim Road - Opp. Grosvenor Motors
30 - 12	:	Clothing with hardware, furniture
Wynberg		Opposite Grosvenor Motors - Coghills Hotel
30 - 10 30 - 17	:	Clothing with shoe shops Clothing with jewellers
Wynberg		Coghills Hotel - end of shopping cent
8 - 17	:	Men's clothing with jewellery
Goodwood		Joubert Road - Mc Donald Street
71 - 72	:	Clothing with clothing
Goodwood		Church Street - Caledon Street
7 - 22	:	Women's clothing with chemist
Goodwood		Railway side of Voortrekker Road
7 - 17 30 - 12	:	Women's clothing - jewellery Clothing with furniture, hardware
Parow		Wicht Street - Smith Street (National Road side)
7 - 17 71 - 72	:	Women's clothing with jewellery Clothing with clothing
Parow		
7 - 24	:	Women's clothing with hairdressers
Parow		
7 - 17 30 - 17	:	Women's clothing with jewellers Clothing with jewellers
Bellville		Broadway Road - Weltevreden Road
30 - 10	:	Clothing with shoe shops
Bellville		Main Road to Paarl - Vlei Road
7 - 22 30 - 10	:	Women's clothing with chemists Clothing with shoe shops

TOTAL FREQUENCIES OF ADJACENCIES FOR THOSE CENTRES FOR WHICH SIGNIFICANT READINGS WERE OBTAINED

TABLE B

Women's Clothing - Chemist	Clothing - Dry Cleaning	Clothing - Clothing	Women's Clothing Hairdressers	Clothing - Furniture hardware	Women's Clothing - soft goods	Men's clothing - men's clothing	Clothing - shoe shops	women's clothing - jewellers	Women's clothing - florists	Men's clothing - florists	Women's clothing - womens clothing	Clothing - Jewellers	Men's clothing - jewellers
3	3	22	2	4	1	2	15	7	1	1	2	3	1
Centres in which the above combination occur ¥													
4	4	4	6	6	15	15	16	17	20	22	22	26	27
30	20	9	33	25		16	26	18				34	
41		23		31			37	31					
		29					41	32					
		32						34					

¥ numbers refer to data set numbers in Appendix A.

Those associations showing the highest degree of affinity are (in order):

Clothing with Clothing
Clothing with Shoe Shops
Women's clothing with Jewellers
Clothing with Furniture, Hardware
Clothing with Jewellers
Women's clothing with Women's clothing
Women's clothing with Chemists
Clothing with Dry Cleaning
Men's clothing with men's clothing
Women's clothing with Hairdressers
Women's clothing with Florists.

Obviously, the combination which decision-makers choose will be affected by the total threshold size of the tributary area, the degree of competition and other extraneous factors.

3. An attempt was made to draw conclusions about the types of areas in which various combinations occurred. If it could be shown that the same combinations occurred in similar areas, the location problem, once the area of location was selected, would be reduced to determining the type of area into which the locating store was moving. Unfortunately, no work has been done on this subject. It is urgently needed. As a crude approximation, shopping centres were grouped into three "hierarchical order classes" -first order, second order and third order. Against these were plotted the number of centres in which particular combinations occurred. Thus

ORDER	Women's clothing - Chemist	General Clothing - dry cleaning	Clothing - clothing	Women's clothing - hairdresser	General clothing - furniture, hardware	Women's clothing - soft goods	Men's clothing - men's clothing	General clothing - shoes	Women's clothing - Jewellery	Women's clothing - Florist	Men's clothing - florist	Women's clothing - Women's clothing	General clothing - Jewellery	Men's clothing - Jewellery	
1st	0	1	2	1	1	0	0	1	2	1	1	1	2	1	14
2nd	3	1	2	1	2	0	0	1	1	0	0	0	0	0	11
3rd	0	0	1	0	0	1	1	1	0	0	0	0	0	0	4
	3	2	5	2	3	1	1	3	3	1	1	1	2	1	29

The null hypothesis was then advanced that the order of the centre and the number of significant affinities were independent. To test this hypothe a G test was applied.[15].

15. Kull-Back, S, M. Kupperman and H.H. Ku: "An application of Information theory to the analysis of contingency tables, with a table of 2 n log n", in Journal of Research of the National Bureau of Standards 66B, No. 4, 1962. pp. 217 - 43

The G- test is designed to compare values of observed and expected frequency tables (2 x 2; 2 x N; K x N) which are normally set out in matrix form. It determines whether the "distance" between the two sets of data is large enough to constitute different "behaviour" or small enough to be regarded as chance variation within the same "behavioural" group. The computation and mathematics of the G - test are involved but a computer programme exists and this is easily applied. The significance of the G readings is determined by consulting a table of χ^2 values (ie. G values are distributed in the same way as χ^2 values). However, where the degrees of freedom exceed 30, the distribution of the G values approximates the normal distribution. To convert the G - value for use with normal probability tables the following formula is used :

$$2G - 2n - 1$$

In this study results were tested at the 5% significance level. The following results were obtained (degrees of freedom 13).

	G reading	5% significance readi
1st order with 2nd order	4.7954	22.36
1st order with 3rd order	0.4778	22.36
2nd order with 3rd order	1.1942	22.36

In no case was a significant value obtained. Therefore the null hypothesis, that order of centre and number of significant affinities are independent, was accepted.

The analysis can be taken no further at this stage. More work on ways of determining basic similarties (if they exist) between shopping centres is urgently required. It is obvious to the writer that the broad rankings used above are too crude to achieve much. Great variation within shopping centres exist and are easily recognizable by eye but to try and equate areas within different centres by eye alone is too haphazard for the result to justify the effort. It has been shown that the pattern (if a pattern does, in fact, exist) is a complex one. Before this pattern can be understood and evaluated, it is necessary for researchers to be able to equate centres and sub-centres within centres, in terms of basic similarities. The first step towards this goal is the effective hierarchical ranking of centres. A method for this has been suggested in Chapter 2.

CHAPTER 5.

The Individual Store

This thesis, thus far, has been concerned with an examination of the locational pattern of clothing stores in Metropolitan Cape Town, with a view to discovering significant locational trends. It is now proposed to take this one stage further and to discuss the procedures and techniques which are necesary for the scientific location of a particular store. Although the specific focus of this study is the clothing store, the techniques discussed are applicable to the location of any store or, and this is important for the planner, any shopping centre, for the procedures involved are the same.

Evaluation of retail investment opportunities within existing commercial sub-districts is often directed towards ensuring that a concern of given size will be successful. Alternatively, the analyst is instructed to establish what the optimum size of a proposed concern in a given locality would be. In both instances, however, the problem remains the same viz. to establish firstly the number of concerns of given size which could be supported by available purchasing power and secondly, how many concerns are already in the area. The difference between these two figures would then indicate whether a concern of the proposed size would be economically viable (or, alternatively, what the size of a proposed business ought to be).

In order to calculate the purchasing power which can be ascribed to a specific retail class, it is necessary as a first step to demarcate the sphere of trade influence (trade area).

The delimitation of a Trade Area

It is important to realize that, strictly speaking, the trade area of any given retail centre is indefinite in extent, in the sense that anybody may, at one stage or another, shop there. It is generally accepted, however, that the centre exerts it's strongest influence in the immediately surrounding area. The further it moves outwards from the centre, the weaker its' influence becomes. Thus the delimiting line is an arbitrary one, set at a point where the analyst believes business volumes coming to the centre will be so insignificant as to be inmeasurable.

A number of techniques have been advanced to facilitate the delimitation of tributary areas.

One of the earliest and most widely used was that advanced by Dr. William Reilly in 1927. Reilly concluded that a city, competing with another for the purchasing power of an intermediate area, has a retail attraction directly proportional to its population size and inversely proportional to the square of the distance from the intermediate area concerned. Thus $\frac{B\,a}{B\,b} = \frac{(P\,a)}{(P\,b)} \quad \frac{(D\,b)}{(D\,a)}^{2}$ (Reilly's law of Retail Gravitation).

Where

a = Centre A
b = Centre B
B = the trade proportion from the intermediate area attracted by the centre concerned.

P = the population of the centre concerned.
D = the distance between the intermediate area and the centre concerned.

In 1947 a significant adaption of the Reilly-model took place. This modification made it possible to determine the point at which two cities would exert equal attraction. This point was called the "breaking point." Mathematically, the adaption was

$$B\,b = \frac{D\,a\,b}{1 + \frac{P\,a}{P\,b}}$$

where

B b = the breaking point between two cities, A and B, measured in miles from city B;

D a b = the distance between cities A and B

P a and P b = the population of the respective cities.

An additional and important amendment took place in 1953 when J.W. Rouse adapted the Reilly Model for use in urban areas. This change was effected by replacing population in the equation by retail floor area, and by substituting travelling time for distance. Mathematically, this was expressed as $\frac{S}{D^2}$ where S is the retail area of the centre and D is the travelling time between the residential area and the centre.[17]

17. The Historical development of the Reilly model was taken from Coetzee, J.G. "Retail Investment Analysis, Delimitation of the Trade Areas of the Wynberg and Claremont Retail Centres", Journal for Geography, Vol. 111 No. 1, September 1967, pp. 42 - 45

A number of criticisms may be levelled at this technique, particularly in its intra-urban application.

(a) Only floor space and driving time are considered as affecting peoples shopping habits. This is a gross over-simplification. In Cape Town, public transportation plays a large role in determining the metropolitan retail structure, yet consumers travelling by public transport are ignored in this technique. Coetzee[18] goes so far as to

18. Ibid.

deny a basic hypothesis of the law - that the consumer would continuously frequent only one centre. He claims that it has been conclusively proved in practice that the consumer cannot compare different centres effectively, and consequently he tends to visit other centes as well (in order to ensure that his initial intuitive choice to frequent one specific centre rather than another was, and remains, correct.)

(b) It is a dangerous oversimplification to say that this amount of business will come from the primary trading area, this percentage from the secondary area, and nothing at all from elsewhere. This results in sweeping judgements for large areas of the city, areas which may be characterized by substantial differences in income, ethnic composition and other factors.

(c) The criticism which, in this writer's view, is the most crippling has not been mentioned in references consulted on the subject. This involves the hierarchical aspect of shopping centres. The technique divides the interstitial purchasing power between centres according to size and distance, but in fact in many cases no division should be made, for the trade area of one centre may wholly encompass the trade area of another, as regards certain goods and services. Moreover, this writer holds that the same is true even in cases where the order of two centres is high enough for both to stock the good and that the crux of the matter is again quality.

(d) Modifications of Reilly's law are particularly unsuited to the Cape Town situation, because of the form and structure of the metropolitan area.

At the core of the entire structure is a strong centre or C.B.D., which is the main retail and employment centre. From this core radiate major transportation arterials, all of which focus on the core and along which public and private transportation media are carried. At points along these arteries are located suburban shopping centres, some of which may best be described as "strings". Consequently much of the passing trade is through traffic. In many cases several centres lie between the origin and destination of passenger trips. The concept of physical distance is thus altered, for in terms of convenience, a higher order centre may be as close as a centre which is physically nearer. In this case, other factors such as the greater range of, and within, goods takes preference over distance.

It is the opinion of this writer that this technique has no validty whatsoever in the Cape Town situation. It's advantages (ease of calculation and swift results) are recognised but are outweighed by the dangers which may produce incorrect and misleading results.

However, it is felt that the principle behind the law, which measures the catchment area of centres according to two factors, attraction and accessibility, is valid. An examination of other trade area studies reveals that these, too, have implicitly used this approach. [19]

19. Bracey, H.E. "Towns as Rural Service Centres" in Transactions of the Institute of British Geography, No. 19, 1953.

Lomas, G.M. " Retail trading centres in the Midlands" in Journal of the Town Planning Institute, Vol. 50, No. 3, March 1964. pp. 104 - 119.

Waide W.L. " Changing shopping habits and their impact on Town Planning" in Journal of the Town Planning Institute, Vol. 49, No. 8, October 1963 pp. 254 - 264.

Regional Shopping Centres - A planning report on N.W. England, Manchester University, 1964.

A Retail Market Potential Model developed in America [20] sought to establish

20. Lakshmanan, T.R. and W.G. Hansen " A retail Market Potential Model" in American Institute of Planners Journal, May, 1965.

a means of measuring the attraction which towns exerted over their catchment areas through the analysis of surveys. The results suggested that the three factors most influencing shopping habits were distance to be travelled, the ease with which journeys could be undertaken and the attraction of the centres visited. The theory was developed that expenditure could be apportioned amongst competing centres in relation to these factors. Distance was measured in terms of visits per week; accessibility was related to public transport services and levels of car ownership; and the attraction of the centre was defined by reference to its turnover in durable goods.

While the criteria used for determining distance and accessibility are acceptable, that used in determining attraction is not, purely because

(a) turnover figures are not readily available in South Africa.

(b) even when extensive field-work is undertaken, results are likely to prove disappointing as shop-owners are reluctant to part with turnover figures, (this has been proved in the case of this study).

Therefore an attempt must be made to find alternative, more physical criteria which can be easily recorded by field work.

In this writer's opinion, there are a number of factors which contribute to the attraction of a centre (these are ranked in order).

(1) The size of the shopping centre (in square feet, not in the number of shopping units).
(2) The range of facilities provided (both inter- and intra-commodity).
(3) The presence of certain types of stores (O.K. Bazaars, Checkers, Woolworths, Ackerman, Foschinis etc).
(4) The quality and price of goods provided.

All these factors are maasurable. It is therefore proposed that an index be compiled from these four factors. The total size of the shopping centre should be multiplied by the total quality factor within that centre (quality should be measured in a manner similar to the one discussed above. It is suggested that the quality index range from 1 - 10 to enable a fairly fine degree of distinction). The combination of quality and size should handle intra-commodity range as well. These total figures should then be scaled down to an index of size quality units ranging from 1 - 30. (this would prevent size and quality from completely swamping range and other indices). To this figure should be added a range factor. All this would entail would be assigning one point to each different type of shop, as defined by some acceptable classification (the categories defined by South African Census Bureau are suggested here). It is important to emphasize that the number of stores within each category can be ignored, as this factor will be represented in the size - quality units. Finally, the presence of major, previously defined generator stores should be scored on a point system. The size of these stores does not vary greatly in a suburban context and it would be acceptable to score one point for each store present. This figure would then be added to the total index which would thus represent a measure of attraction.

This index could then be employed in the model developed by a Research Group in the West Midlands branch of the Town Planning Institute. [21]

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21. Predicting Shopping Requirements, The Town Planning Institute, West Midlands Branch. August, 1967.

In this model, the study area is divided into population units, the size of which depend on the scale of the project. The smaller the population unit sub-divisions, the more accurate will be the results, since the input factors computed for a large unit could be made more sensitive to local variations if the unit were sub-divided. On the other hand, smaller units involve more work and a balance must be reached between the collection of data, the volume of calculations and the degree of accuracy required. It is suggested here that census ennumerator sub-districts would be the most convenient sized units for Cape Town conditions.

For each unit, expenditure per head is then calculated and multiplied by the population figure to obtain the retail expenditure generated in any one population unit.

It is then necessary to locate all the shopping centres competing for the trade of the defined population units. It must be remembered that major centres lying outside any defined study area will also influence the shopping patterns within it by drawing away some of the trade and any such centres must be included. The amount of spending for which a centre can compete must then be determined (this is the "competitive level"). This is done by dividing trade into distinct categories.

(a) Accessibility trade - this is trade done in convenience goods shops or durable good shops such as chemists, drapers and hardware.

(b) Attraction trade - Those durable goods not mentioned above.

Two calculations are then made for each population unit.

Calculations for Accessibility Trade

The shopping centres to which trade might go should be listed for each population unit, beginning with the nearest centre in terms of journey time and continuing until a centre is reached which will take all the trade (i.e. a centre with a full range of accessibility goods). No centre further away from the population unit need be included if there is another centre with an equal or higher competitive level which is definetely more accessible. Where accessibility is only marginally different, it is better to include both centres. The presence or absence of only one shop may vary the competitive level of a centre so that, in order to reduce the volume of calculations, minor variations are ignored (the research group suggests that only changes of about 15% should be regarded as implying a significant change in status). The accessibility parameter for each centre is then determined according to the time taken to reach it (it is suggested by this writer that a index relating to the amount of parking available should be included) and the public transport facilities available. The resulting parameters are totalled and each of them is then expressed as a percentage of the total to give the proportion of trade attracted.

Calculations for Attraction Trade

This is approtioned in much the same way, except that the competitive level is replaced by the attraction factor, and now the relevant accessibility parameters need to be multiplied by the attraction factor. In the West Midlands study, the only criterion used for measuring the attraction of a centre was the presence of pre-defined generators (i.e. the equivalent of O.K. Bazaars, Woolworths, Ackermans, Checkers etc.). In this writer's opinion, this is not adequate as often these stores, which are big enough to attract trade, take on a frontier function and move into smaller centres. It is true that development often follows, but the time-lag incurred is important.

Accessibility and attraction trade can be totalled for every centre from every population unit to obtain an estimate of the total turnover of each centre. This figures can then be converted into spatial needs by use of techniques which are currently available.

Unfortunately, lack of time prevented the testing of the model, or the modifications suggested by this writer, in the Cape Town situation. The model would seem to have considerable merit and to offer an interesting line of research for the future.

The Micro-Analysis Technique

Another method of trade area delimitation which is widely used is the micro-analysis method. This technique lies about mid-way between the simple, rule of thumb techniques (such as Reilly's law) and the more complicated mathematical models; it is more accurate and more expensive than the rule of thumb methods, but less refined and less expensive than the mathematical models.

The method calls for the sub-division of the study area into smaller units. Each of these sub-divisions is then analysed in detail, by means of a field survey in which a number of relevant questions are put to the consumer public, in order to establish the shopping habits of the inhabitants. Information thus collected is plotted onto maps and as a final step iso-value points are connected to define the trade area.

Two methods of sub-division of the study area are commonly employed. The first method comprises division into the smallest possible units for which census statistic are available. The alternative technique consists of arbitary division into a number of octant segments. This delimitation is created by projecting a line running directly North and Sotuh from the centre, and another line running East and West, thus forming quadrants. The quadrants are then besected by a line running Northeast - Southwest and another running Northwest -Southeast forming octants. Finally, a series of concentric circles are drawn around the centre itself, as far as the outer limites of the centre's attraction. Both methods have advantages. With delimitation by census units, strong emphasis is placed on homogeneity, as regards racial, social, economic and other factors. This advantage is lacking in the case of the Octant technique. Moreover, population figures can be more easily calculated, and more accurate projections are possible in the census technique than in the Octant method in which arbitrary boundaries cut across census tracts.

However, the Octant technique has an important advantage. The percentage of people who visit a shopping centre generally drops very rapidly as distance from the centre increases (Reilly claims that attraction is inversely proportional to the SQUARE of the distance). The technique creates very small areas for intensive analysis close to the centre, but increasing in size as distance from the centre increases (this is bacause of the segment shape).

Generally, however, the advantages of the census tract method would appear to outweigh those of the Octant method.

The micro-analysis method has much to commend it and is probably the best technique available for a relatively quick study of any particular area.

Micro-Location Analysis

Once it has been calculated that the tributary area of a centre can support another (or a first) clothing store of a particular size, the question to be answered is "where to locate it within the centre?". The answer to this has been indicated, on a larger scale, in previous chapters. It has been proved, by Nearest Neighbour and other techniques, that accessibility to consumer population determines the pattern of clothing stores one to another. It has been further shown that accessibility is determined by the means of transport available to the consumer. Both these factors determine the detailed location of the clothing store.

There are two types of retail location - generative and suscipiei

"A generative location is one to which the consumer is directly attracted from his place of residence; to shop there is the principle purpose of the consumer in leaving his residence. Such a location is selected expressly to be easily accessible to the greatest proportion of persons away from home for the primary purpose of shopping.

A suscipient location is one to which the consumer is impulsively or co-incidently attracted while away from his place of residence for any primary purpose other than shopping" 22

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22 Nelson, R.L. op. cit. p. 45.

Generally, clothing stores are both generative and suscipient in character. The degree or dominance of each depends on the type of store in question. For instance, high style, expensive, ready-to-wear stores are highly generative, while poor quality stores are almost entirely suscipient. In most cases, however, clothing stores have a lower proportion of self-generative business than, for instance, Department or Variety stores. Consequently they have a greater need for a prime location and this usually involves locating with respect to a larger generator (unless the pedestrian traffic is being generated by non-retail causes). This observation is confirmed by the pattern in Cape Town. It has been shown in Chapter 3 that the larger, more aware stores have tended to gravitate towards major generators such as O.K. Bazaa Woolworths, Ackermans etc. Further confirmation was provided by interview with shop-owners. While, in almost every case, smaller shop-owners had ve little idea why they were there at all, representatives of five clothing chain stores said they located in an area specifically because of the proximity of a generator. The type of generator to which clothing stores gravitate depends on the quality and price of the merchandise provided. Thus higher price stores gravitate towards Department stores while lower and middle priced stores aim for Variety Stores, Supermarkets and large General Dealers. This pattern was again confirmed by interviews. Representatives of the large chain stores mentioned above all claimed they looked for a particular, and not any, generator before deciding where to locate. Again, however, the vast majority of store-owners were unaware of the advantages of locations near generators. These people choose locations on the basis of cheapest rents and plain intuition (which is often proved wrong). The extent to which most shop-owners are ignorant of, and insensitive to, the subleties of location is one of the most positive findings of this study.

However, location in proximity to Department stores, Variety stores or Supermarkets is not the only way in which consumer generation can be assured. Studies have shown that certain kinds of stores gain benefit from locating in proximity to stores of the same kind. This has been described by Nelson as "the law of cumulative attraction". "A given number of stores dealing in the same merchandise will do more business if they are located adjacent or in proximity to each other than if they are widely scattered." 23 It is

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23. Ibid, p. 58.

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generally accepted that stores selling items which involve a great deal of shopping about for style, design, colour, and fit gain more through cumulative attraction than convenience stores. What, then, are the options facing a store locating in an existing centre in which competition is present, and how have stores reacted to this situation in Cape Town?

The options facing a firm are :

(a) Locate in an interceptor position between the market (the people in the trading area) and the market place (the traditional source of the same goods), so that customers will be intercepted on their way to the market place.

(b) Locate near one's competitor and benefit from cumulative attraction.

(c) Locate near one's competitor, on the side of the market, and undercut.

It must be stated from the outset that the last solution has been prevented in the past through the mechanism of retail price maintenance. The mechanism within the clothing industry is controlled by suppliers, who sanction infringements by withholding supplies. There is now talk in Governmental circles of withdrawing retail price maintenance - if this happens the locational choices of any clothing store will be as above.

The existing pattern in Cape Town shows evidence of both (a) and (and there is a strong size and quality correlation within the pattern. Larger, better quality stores tend to group together. Although interviews revealed that this pattern is partly unconscious (all large stores claimed that proximity to another clothing store was not a locational factor - it just happens as large clothing stores are all looking for the best sites in relation to generator stores and maximum pedestrian movement) most stores acknowledge that they did gain benefit from the combined market pull of the clothing cluster.

Amongst smaller stores in poorer areas, however, there is a tendency for stores to locate away from competition. (this can be seen from the maps by the wide spacing of stores towards the edges of shopping centres - quality tends to decline towards the fringes of the centr Although interviews suggest that this is a fairly blind reaction, it probably leads to a pattern which approaches the optinum. The difference between patterns for the bigger, better quality stores and these poorer ones lies in the subtle distinction which exists in the clothing industry between competitive and complementary goods. Generally the better quality stores are fairly complementary, for colours, styles, fit and, to an increasing extent, brand names found in stores differ and complement each other. In poorer stores, however, the type of good provided from one store to another is repetitive. Therefore the logical location for an store is away from the competitive store on the side facing the largest market segment.

It is unlikely that the abolition of retail price maintenance will affect the location pattern to any marked degree. When shop owners were asked whether there would be advantage in locating near a competing store and undercutting, replies in almost all cases indicated that this approach had never been considered. In most cases, the reply was a lame,

"Well, its not so easy in the clothing industry". The decision whether to undercut or whether to benefit from cumulative attraction and to compete on grounds of service, range of goods and display would depend on the relative advantages to be gained in each case. However, as competition within centres increases, and excess profits are reduced to normal profits, the solution of undercutting could well be the most effective for a store, with sufficient power and resources, which is attempting to break into the centre.

The third factor which determines accessbility and generation is t principle of "Retail Compatibility". Certain kinds of

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24. Ibid, p. 66.

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business are compatible; that is, their total volume of trade is higher than it would be if they were located apart (See Chapter 4). Nelson claims that the business generated through compatibility is measurable." Two compatible businesses located in close proximity will show an increase in business volume directly proportionate to the incidence of total customer interchange between them, inversely proportionate to the ratio of the business volume of the larger store to that of the smaller store, and directly proportionate to the sum of the ratios of purposeful purchasing to total purchasing in each of the two stores".[25]

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25. Ibid, p. 66

These relationships are expressed in the equation :

$$V = I\,(Vl + Vs) \times \frac{Vs}{Vl} \times \left(\frac{Pl}{Vl} + \frac{Ps}{Vs}\right)$$

in which :

Vl = Volume of larger store (total purchasing)
Pl = Purposeful purchasing in larger store (a purposeful purchase is one made by a shopper who, when interviewed, states that a visit to the store was a major purpose of the shopping trip)
Vs = Volume of smaller store (total purchasing)
Ps = Purposeful purchasing in smaller store
V = increase in the total volume of two stores
I = degree of Interchange.

All these factors of accessibility and business volume generation would have to be evaluated for each potential site. The site offering the highest business volume potential would be, ceteris paribus, the most desirable.

However, the ceteris paribus condition must be carefully examined in every situation, for location has two sides, turnover and costs, and only

turnovers have been discussed above.

An attempt was made to obtain accurate cost figures through interviews with shopowners. Unfortunately, this met with limited success because ;

(a) Many shopowners genuinely had very little idea of total costs as a proportion of turnovers (this would be the only meaningful way to protray costs, as absolute figures mean very little) and no idea at all of the proportionate breakdown.

(b) Those larger stores which did have the information to hand were reluctant to part with it.

However, a number of facts did emerge. The average mark-up on products is about 40%; thus 60% of total turnover is taken up by costs. The main costs factors, ranked in order of magnitude are :

(a) Capital outlay on goods and materials
(b) Labour
(c) Rent
(d) Services.

Capital outlay generally is a constant which is independent of location. The only variable in this category is the transportation costs of supplies, and these vary from situation to situation. Generally, these costs are borne by the supplier, but this is subject to negotiation with individual firms. Even in cases in which the retailer bears these costs, however, the amounts involved are not large enough to affect location.

Labour costs form a large proportion of total costs but they, too, do not force location because,

(1) Within any large area variation is negligable. The only exception to this in the Cape Town context is created by the racial barrier. White workers generally are paid more than Non-white workers and white workers are essential in white areas.

(2) To a large degree, labour is a "controllable" factor. If labour costs are becoming too high, workers can be laid off or transferred to branches in other areas where more labour is needed. Even in the exception stated above, labour factors are controlled for although white workers are retained to deal directly with the customer, all "behind-the-scenes" work is carried out by Non-whites.

Rent is the largest, non-controllable variable in the cost equation. In a suburban context rents are fairly constant at 3 - 4% of turnover, and thus they do not affect the location pattern. Those small variations which do occur can be absorbed easily by reorganising merchandising techniques to utilize selling space more efficiently.

Within the C.B.D., however, rents are often as high as 15% of turnover, and this amount may be sufficient to make suburban sites more attractive than central city sites for certain firms. Here turnover gains must be carefully weighed against increased rental costs. Within

the C.B.D., however, variations are not large enough to affect the pattern noticeably.

Service costs as a proportion of total costs are small and variation negligable. They do not affect the location pattern.

It can be concluded, therefore, that factors affecting turnover are almost the sole determinants of the location pattern. Rents have some affect on the broad pattern but within centres their affect is negligable.

Changes which may affect the Location Pattern.

The two most significant changes occurring within the clothing industry are inter-related.

(a) There is trend towards larger sized stores.

(b) Chain-store complexes are developing and firms which were traditionally located within the Central Business District. now have suburban branches. In effect, this is an increase in brand name merchandising for the name of the store offers a guarantee as to the quality and range of good provided.

The trend towards larger store units is illogical. It is occurring because large corporations are tending to dominate the market. These corporations have considerable resources and as total turnover is greater for larger stores than for smaller, the corporations are investing in larger units. However, turnover figures (table 13) show conclusively that returns on investment decrease as size of store units increases. A survey [26] conducted a few years ago within metropolitan Cape Town emphasized this point,

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26. Survey by Mr. Z.S. Gurzinski. Data unpublished.

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for it revealed that 60% of consumers would prefer to shop at small units, as they felt service and quality were better. (It is interesting to note that a survey conducted this year in a smaller country centre -Bloemfontein - revealed that almost the same percentage of people preferred larger stores, as the range of goods provided was greater.) [27]

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27. Survey by M.Z.S. Gurzinski and Mr. K.S.O. Beavon. Data unpublished.

The combined effect of these two factors may conceivably weaken the role of the C.B.D. within the commercial hierarchy, for the larger better quality stores which previously were a characteristic of the C.B.D. can now be found in the suburbs. However, in the writer's opinion, this is unlikely.

(this is unlikely.) The Bloemfontein survey mentioned above has proved conclusively that considerable "shopping about" for clothing goods does in fact occur, and the range of goods provided in the C.B.D. cannot be matched in any suburban centre. It is probable that the decreasing rate of decentralization will continue more rapidly as the C.B.D. sheds its convenience functions and emerges more clearly as the highest order shopping goods centre.

CHAPTER 6

A new approach to the Problem of Retail Location [28]

This study has been esentially concerned with the analysis of an existing pattern; that is, with the way in which clothing retailers have adapted to a changing situation. This type of study is necessary, for a large proportion of total retailing is conducted in developed centres. Today, however, a new type of problem is arising. Business area problems are often of such complexity that the success of the solution depends upon the scale of the measures used in that solution. Consequently large areas in the centre of shopping districts or entire shopping centres are being developed *a priori*, as complete functional units. The question now arises : "What is the ideal pattern of shops within a centre?" Existing patterns often reflect the influences of historical inertia, accident and other extraneous factors which lead to a solution that is often far from ideal. This is possible as the range between the retailer covering costs and maximising profits is a large one. Store owners, provided they are not operating at a loss, are often insensitive to forgone opportunity cost. Moreover, although the market system does tend to correct excessive departures from the ideal, it does so in a manner which is socially wasteful, as witnessed by the high mortality rate in most retailing categories. Thus the market mechanism arrives at an imperfect solution in a wasteful manner. It is the planner's job to improve on both these counts; to arrive at a better solution with less waste of community resources. To do this, it is no longer sufficient to regard location from the point of view of one shop only. The planner must attempt to arrive at the best total solution. Every shop owner is primarily concerned with increasing his own turnover; every shopping centre has some locations which are better than others; therefore every retailer gravitates towards the same site. According to economic theory this dilemma is resolved through the mechanism of rent - the one who can afford to pay the most gets the site. It is true that rent does tend to produce a pattern which approximate the ideal but its influence is not strong. There are two reasons for this :

(a) There are restrictions on rent, for it is not solely determined by supply and demand. Moreover, there is necessarily a time lag between fluctuations in rent and responses on the ground.

(b) Rent is not a strong enough factor to determine the detailed pattern to any great degree. Generally, rents amount to only 3 - 4% of turnover per annum, and most shops find it fairly easy to cover the additional costs by re-organising to utilize space more efficiently.

Therefore an alternative method must be found to determine the best arrangement of shops on the ground.

The hypothesis upon which the following idea is based is that the most efficient arrangement of shops can be determined by maximizing

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28. The influence of Mr. Z.S. Gurzynski, Senior lecturer in the Department of Economics, U.C.T., on this section is gratefully acknowledged.

consumer convenience. By approaching the pattern from the point of view of the consumer rather than of the retailer the total business generated in any one centre is increased. Thus, in the long run the interests of the consumer and the retailer are coincident, although certain retailers would have to forgo locations which may be best for them, but which would not be best for the whole.

The Operation of a Shopping Centre

Every shopping centre is structured around one or more generators. Even if the generator is inserted into an existing area the centre of gravit of that area changes and a realignment of shops takes place over time. Once the generator (Shop A) has been located other shops compete for positions around it. This competition is imperfect, as mentioned above, and is often affected by the ignorance and market insensitivity of certain owners. In theory, however, the shop (shop B) which benefits most from proximity to the generator will be prepared to pay the most for the site and will therefore occupy it. Similarly the next highest bidder (shop C) will locate next to shop B and so on. In plane form, then, the structure of a centre can be seen as a series of rings around a hard core or generator

As the sphere of influence of the centre increases, the threshold may become large enough to support a competitive generator (shop A2). These competitors would tend to locate away from each other and to divide the market effectively between them (the alternative is to locate close to the competitor and to undercut, but this solution is not favoured by large generators). If the threshold is large enough, the newly located generator will attract a competitor to shop B, (shop B2) and B 2 will tend to locate next to A2 on the side facing A1. Thus around each generator a separate structure would develop. If, however, the threshold is not large enough to support two shop B's, then Shop B will gravitate towards the centre of the area between A, and A2. In this position Shop B would maximize its turn over. Thus shops tend to arrange themselves along a line between A and B and certain patterns and associations arise between them. Those shops dependent on impulse purchases particularly favour locations of this kind. Along the line, adjustments are made as certain shops benefit from proximity to other shops. This type of situation, in which shops are arranged between two generators, occurs fairly frequently. Often the success of the whole is affected by design factors (such as the location of doors, wind protection etc) within the generator buildings.

The above discussion provides the clue to the ideal arrangement of shops within a centre. Shopping surveys conducted in Cape Town [29] have shown that the generators

29. Surveys conducted for the Provincial Administration by this Writer and others. Information as yet unpublished.

within each centre are of a few basic kinds, and that the kind appears

dependent on the order of the centre. Thus for higher order centres Department or Variety Stores provide the main generation while in lower order centres, poorer Variety Stores, large general dealers or supermarkets fulfull this function. This suggests two things

(a) that a fairly similar ideal pattern may be applicable to centres of similar order (the pattern is obviously controlled by the stringencies of expendable income and of mobility)

(b) That by examining patterns in existing areas a guide can be provided for a theoretical model.

The Method

It is postulated here that the types of shops visited in any centre are similar to those in any other centre of similar order. It is further postulated that the arrangements of shops in any centre should, for maximum efficiency, be determined on the basis of consumer convenience. Therefore, by studying the sequences of shops visited by consumers (i.e. "Shopper sequences") a model arrangement can be determined and by corrolating this model to the sequences of shops as they appear on the ground, a measure of the morphological strength or weakness of the centre is obtained. Moreover, on the basis of the measure, discrepencies between observed and expected patterns can be highlighted and solutions suggested.

The measure of shopper sequences is easily obtained. Shoppers visiting the centre are questionned as to which shops they visited during their shopping trip. On the basis of these replies a hierarchy of shops, in order of number of visits, can be determined. It is true that the shopping pattern of consumers will be affected by what is on the ground, but here we are not interested in the order in which shops were visited, but in the total number times that any particular type of shop was visited.

In terms of the model, the main generator would be located in a key position, the next most visited shop would be next to it and so on. Those shops which are dependent on impulse buying must be carefully handled. They can be identified by the measure by asking consumers after a shopping trip.

(a) which shops had they intended visiting?

(b) which shops had they actually visited?

Those shops which are visited fairly regularly, but which do not generate individual trips, are "impulse shops". Once identified, the shops can be located in a manner which would maximize total advantage.

In some cases, the generation of two or more shops which gain advantage from locational proximity (such as certain types of clothing stores) would have to be considered together, as the traffic generated by these shops in total would be greater than the sum of their individual generating capacities.

The particular pattern is any model would be regulated by the total threshold of the tributary area, for this would determine the numbers of each type of shop which the centre could support.

Once the model has been constructed it can provide a measure of departure from the ideal. Thus, if there was no correlation between the pattern on the ground and the pattern of shopper sequences, the reading would be zero. If they correlated exactly, the reading would be one. In this manner, areas in which change would improve the whole could be isolated.

This approach to the problem of retail location has never been employed but it seems to offer great possibilities for the future. The biggest problem to be solved is a statistical one concerning the correlation between shopper and shop sequences, but it would also be important to find out how universal the method would be; that is, to what extent are shopping patterns repeated in centres of comparable order. This would seem to offer an interesting line of research for the future.

TABLES

TABLE 1

1904

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN THE PENINSULA	TOTAL NO. OF CLOTHING STORES IN PENINSULA
9	Malay Quarter	4.23	6.39	140
8	Simonstown	12.0	5.68	140
10	Wynberg	4.9	7.1	140
1	2nd Avenue, Kenilworth	5.8	0.71	140
9	Claremont	5.13	6.39	140
1	Mowbray	1.8	0.71	140
2	Observatory	3.8	1.42	140
7	Albert Road	2.1	4.97	140
2	Victoria Road	1.38	1.42	140
26	District 6	3.64	18.46	140
1	Sea Point	1.35	0.71	140
1	Roeland Street	1.7	0.71	140
63	C.B.D.		44.73	140
140				

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1904
1	Sea Point	2.0	0.82	122	0
4	Victoria Rd, Woodstock, Salt River	3.16	3.28	122	100.0
7	Albert Road, Woodstock, Salt River	2.94	5.74	122	0
1	Maitland	1.47	0.82	122	0
2	Mowbray	2.52	1.64	122	100.0
10	Claremont	6.25	8.2	122	10.0
6	Wynberg	3.12	7.5	122	66.66
5	Simonstown	7.70	4.10	122	60.00
1	Kalk Bay	3.22	0.82	122	0
2	Observatory	1.58	1.64	122	0
51	Centre		41.82	122	19.04
25	District 6	3.82	20.5	122	3.84
115					12.85

NOTE: FIGURES NOT AVAILABLE FOR MAL Y QUARTER

1921

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1911
1	Sea Point	1.4	0.99	101	0
5	District 6	2.05	4.95	101	80.0
2	Victoria Road	1.8	1.98	101	100.00
1	Observatory	1.5	0.99	101	100.00
4	Albert Road	2.0	3.96	101	42.85
3	Mowbray	4.8	2.97	101	50.0
7	Claremont	4.9	6.93	101	30.0
1	Lansdowne Road	4.2	0.99	101	0
8	Wynberg	6.4	7.92	101	33.3
2	Wynberg - Durban Road	14.2	1.98	101	0
1	Plumstead	12.5	0.99	101	0
1	Kalk Bay	3.3	0.99	101	0
7	Simonstown	10.5	6.93	101	40.0
43	C.B.D.				15.68
86					29.5

TABLE 4

1936

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1921
1	Athlone	1.8	0.61	163	0
3	Sea Point	2.1	1.83	163	200.0
1	Malay Quarter	0.64	0.61	163	0
1	Tamboerskloof	1.2	0.61	163	0
19	District 6	3.42	11.59	163	280.00
9	Victoria Road	4.05	5.49	163	350.00
1	Observatory	1.25	0.61	163	0
26	Albert Road	6.5	15.86	163	271.0
1	Maitland	0.8	0.61	163	0
2	Mowbray	2.8	1.22	163	50.0
1	Rondebosch	2.2	0.61	163	0
9	Claremont	5.4	5.49	163	28.57
1	Lansdowne Road	1.8	0.61	163	0
17	Wynberg	6.8	10.37	163	112.5
2	Muizenberg	3.6	1.22	163	0
2	Simonstown	3.2	1.22	163	71.42
67	C.B.D.		40.87	163	55.81
163					89.53

1946

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1936
13	Sea Point	8.25	7.67	168	333.33
16	District 6	3.36	9.44	168	15.78
11	Victoria Road	5.06	6.49	168	22.22
1	Observatory	1.44	0.59	168	0
22	Albert Road	6.6	12.98	168	15.38
5	Maitland (incl. Kensington and Windemere)	3.6		168	400.0
1	Mowbray	1.96	0.59	168	100.0
1	Durban Road - Mowbray	5.88	0.59	168	0
1	Brooklyn	2.27	0.59	168	0
3	Rondebosch	7.14	1.77	168	200.0
18	Claremont	9.9	10.62	168	100.0
2	Kenilworth	10.52	1.18	168	0
21	Wynberg	8.82	12.39	168	23.52
2	Muizenberg	2.8	1.18	168	0
2	Simonstown	2.6	1.18	168	0
49	C.B.D.		28.91	168	26.86
168					5.08

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1946
. 24	Sea Point	12.0	10.56	225	45.83
1	Malay Quarter	0.83	0.44	225	0
1	Tamboerskloof	1.51	0.44	225	0
2	Gardens	3.84	0.88	225	0
1	Roeland Street	2.5	0.44	225	0
16	District 6	3.36	7.04	225	0
1	Camps Bay	5.55	0.44	225	0
19	Victoria Road	10.07	8.36	225	72.72
4	Observatory	4.64	1.76	225	300.0
17	Albert Road	4.76	7.48	225	22.72
4	Maitland	4.48	1.76	225	20.0
3	Mowbray	5.64	1.32	225	200.0
1	Mowbray-Durban Road	4.54	0.44	225	0
4	Brooklyn-Rugby	5.76	1.76	225	300.0
5	Rondebosch	13.85	2.2	225	66.6
1	Newlands	25.0	0.44	225	0
26	Claremont	16.12	11.44	225	44.44
3	Lansdowne Road	4.46	1.32	225	0

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1951

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1946
25	Wynberg	12.0	11.0	225	19.04
1	Plumstead	3.22	0.44	225	0
3	Muizenberg	6.12	1.32	225	50.0
2	Fish Hoek	5.0	0.88	225	0
1	Simonstown	2.12	0.44	225	50.0
1	Southfield	4.54	0.44	225	0
1	Athlone	0.75	0.44	225	0
58	C.B.D.		25.52	225	18.36
225					33.92

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1951
1	Steenberg	10.0	0.16	620	0
5	Southfield	9.4	0.8	620	400.0
2	Rylands	4.0	0.32	620	0
5	Simonstown	5.8	0.8	620	400.0
4	Rosebank	10.52	0.72	620	0
6	Rondebosch	7.5	0.96	620	20.0
7	Retreat	8.47	1.12	620	0
4	Plumstead	4.92	0.72	620	300.0
4	Pinelands	12.48	0.72	620	0
32	Bellville	9.92	5.12	620	0
3	Bellville - 12th Avenue	4.89	0.48	620	0
5	Durbanville	9.6	0.8	620	0
2	Camps Bay	6.24	0.32	620	100.0
40	Albert Road	16.4	6.4	620	135.29
16	Fish Hoek	14.08	2.56	620	700.0
11	Elsies River	15.84	1.76	620	0
44	Parow	12.76	7.04	620	0
37	Victoria Road	13.32	5.92	620	94.73
9	Lansdowne Road	7.38	1.44	620	200.0
2	Tiervlei	3.76	0.32	620	0
9	Gardens	4.14	1.44	620	350.0

PAGE 2/.....

NUMBER OF CLOTHING STORES PER CENTRE	AREA	CLOTHING STORES AS % OF TOTAL NO. OF SHOPS IN THAT AREA	CLOTHING STORES IN THAT CENTRE AS % OF TOTAL NO. OF CLOTHING STORES IN PENINSULA	TOTAL NUMBER OF CLOTHING STORES IN PENINSULA	% OF CHANGE IN CLOTHING STORES IN THAT CENTRE OVER 1951
22	Crawford-Athlone	11.22	3.52	620	0
1	Bonteheuwil	1.63	0.16	620	0
10	Brooklyn	10.8		620	150.0
3	Diep Rivier	8.84	0.48	620	0
22	District 6	3.96	3.52	620	37.5
1	Gleamore-Belgravia	1.44	0.16	620	0
3	Grassy Park	5.16	0.48	620	0
3	Heathfield	10.32	0.48	620	0
1	Hout Bay	2.85	0.16	620	0
1	Kalk Bay	2.85	0.16	620	0
2	Kenilworth	5.68	0.32	620	0
3	Kensington	5.16	0.48	620	0
2	Windemere	4.86	0.32	620	0
1	Langa	2.85	0.16	620	0
12	Maitland	9.0	1.92	620	300.0
2	Milnerton	14.28	0.32	620	0
5	Mowbray	5.55	0.80	620	66.6
5	Muizenberg	5.85	0.80	620	66.6
1	Newlands	5.55	0.16	620	0
9	Observatory	4.32	1.44	620	125.0
35	Goodwood	18.56	5.6	620	0
37	Sea Point	10.73	5.92	620	54.16
49	Wynberg	10.78	7.84	620	96.0
34	Claremont	9.52	5.44	620	30.76
108	C.B.D.		17.28	620	86.2
620					175.55

TABLE 1 - 7

a. PERCENTAGE OF ALL SHOPS IN AREA
b. PERCENTAGE OF TOTAL CLOTHING STORES

	1904	1911	1921	1936	1946	1951	1969
a. Malay Quarter	4.23		-	0.64	-	0.83	-
b.	6.39		-	0.61	-	0.44	-
a. District 6	3.64		2.05	3.42	3.36	3.36	3.96
b.	18.46		4.95	11.59	9.94	7.04	3.52
a. Sea Point	1.35	2.0	1.4	2.1	8.25	12.0	10.73
b.	0.71	0.82	0.99	1.83	7.67	10.56	5.92
a. Victoria Road	1.38	3.16	1.8	4.05	5.06	10.07	13.32
b.	1.42	3.28	1.98	5.49	6.49	8.36	5.92
a. Albert Road	2.1	2.94	2.0	6.5	6.6	4.76	16.4
b.	4.97	5.74	3.96	15.86	12.98	7.48	6.4
a. Observatory	3.8	1.58	1.5	1.25	1.44	4.64	4.32
b.	1.42	1.64	0.99	0.61	0.59	1.76	1.44
a. Mowbray	1.8	2.52	4.8	2.8	1.96	5.64	5.55
b.	0.71	1.64	2.97	1.22	0.59	1.32	0.8
a. Rondebosch	-	-	-	2.2	7.14	13.85	7.5
b.	-	-	-	0.61	1.77	2.2	0.96
a. Claremont	5.13	6.25	4.9	5.4	9.9	16.12	9.52
b.	6.39	8.2	6.93	4.9	10.6	11.44	5.44
a. Wynberg	4.9	3.12	6.4	6.8	8.8	12.0	10.78
b.	7.1	7.5	7.92	10.3	12.39	11.0	7.84
a. Fish Hoek	-	-	-	-	-	5.0	14.08
b.	-	-	-	-	-	0.88	2.56
a. Simonstown	12.0	7.7	10.5	3.2	2.6	2.12	5.8
b.	5.68	4.1	6.93	1.2	1.18	0.44	0.8
a. Goodwood	-	-	-	-	-	-	18.56
b.	-	-	-	-	-	-	5.6
a. Parow	-	-	-	-	-	-	12.76
b.	-	-	-	-	-	-	7.04
a. Bellville	-	-	-	-	-	-	9.92
b.	-	-	-	-	-	-	5.12

TABLE 8

RANKING OF CENTRES BY PERCENTAGE OF TOTAL CLOTHING STORES

1904	1911*	1921*	1936	1946	1951	1969
C.B.D.	C.B.D.	C.B.D.	C.B.D.	C.B.D.	C.B.D.	C.B.D.
District 6	Claremont	Wynberg	Albert Rd.	Albert Rd.	Claremont	Wynberg
Wynberg	Wynberg	Claremont	District 6	Wynberg	Wynberg	Parow
Claremont	Simonstown	Simonstown	Wynberg	Claremont	Sea Point	Albert Rd.
Malay Quarter	Albert Rd.	District 6	Claremont	District 6	Victoria Rd.	Sea Point
Simonstown	Victoria Rd.	Albert Rd.	Victoria Rd.	Sea Point	Albert Rd.	Victoria Rd.
Albert Rd.	Observatory	Mowbray	Claremont	Victoria Rd.	District 6	Goodwood
Victoria Rd.	Mowbray	Victoria Rd.	Sea Point	Rondebosch	Rondebosch	Claremont
Observatory	Sea Point	Observatory	Mowbray	Simonstown	Observatory	Bellville
Sea Point		Sea Point	Simonstown	Observatory	Mowbray	District 6
Mowbray			Malay Quarter	Mowbray	Fish Hoek	Fish Hoek
			Observatory		Simonstown	Observatory
			Rondebosch		Malay Quarter	Rondebosch
						Mowbray
						Simonstown

* NOTE : THERE ARE NO FIGURES FOR DISTRICT 6 OR THE MALAY QUARTER

TABLE 9

POPULATION

EUROPEANS

AREA - Wards	1911	1921	1936	1946	1951	1960	1969
Sea Point	8063	11159	19015	14647	14635	16260	30000
Harbour		5038	4008	12537	12058		
West Central		1755	1003	9107	25911	26229	11000
Kloof	29863	9264	10135	16208			
Park		9176	11791	8513			
East Central		5892	7347	6327	8764	8619	16600
Castle		4076	1422	13743			
Woodstock	17951	11279	12302	15970	14454	12261	23500
Salt River		11530	14322	18898			
Mowbray	6729	9269	13929	4280	17679	16438	17200
Maitland *	2582	3750	10010	7162	17651	17345	18000
Rondebosch	3224	6334	11015	11543	13551	17164	18000
Claremont	3850	6627	14947	11700	14442	14971	15800
Kalk Bay	1931	4953	6150	11842	10683	12699	13400
Wynberg	7348		15528	10817	25204	24834	31800
		NON - EUROPEANS					
Sea Point	1720	2353	3017	3140	3275	3124	12900
Harbour		4095	4043	5320	6056	5611	
West Central		3524	4342	10819			
Kloof	37296	5852	6680	2584	16656	1550	19300
Park		2217	1902	23092			
East Central		14535	20478	23846	25228	24746	3500
Castle		2850	14750	10233			
Woodstock	10733	5075	9542	24156	40830	40240	95000
Salt River		5723	7487	8809			
Mowbray	2543	2621	2954	24652	5522	3792	5700
Maitland *	3079	4275	10723	11384	33743	45195	65800
Rondebosch	2391	8518	21784	10360	6529	8089	12000
Claremont	9485	662	13958	10732	13570	12485	18500
Kalk Bay	1596	3793	5409	11295	24929	35712	58450
Wynberg	8677		15761	17627	24834	26528	39500

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TOTAL

AREA - Wards	1911	1921	1936	1946	1951	1960	1969
Sea Point	9783	13512	22037	17787	17910	19384	42900
Harbour		9133	8051	17857	18114	17783	
West Central		5279	5345	4345			
Kloof	67159	15116	16815	18792	42567	41752	30300
Park		11393	13693	31605			
East Central		20427	27825	29813	33992	33365	20100
Castle		6926	16172	23976			
Woodstock	28690	16354	21846	40162	59556	54207	118500
Salt River		17253	21800	27707			
Mowbray	9272	12890	16683	28932	23201	20230	22900
Maitland *	5761	8025	20733	18510	51404	62540	83800
Rondebosch	5625	14852	32799	21903	20080	25253	30000
Claremont	13335	7289	28905	22432	28012	27456	34300
Kalk Bay	3527	8746	11559	23137	35712	51550	71850
Wynberg	16015	31289	28444	28444	50038	56898	71300

* INCLUDES WINDEMERE

SOURCE : MEDICAL OFFICER OF HEALTH

TABLE 10

PERCENTAGE MORTALITY RATES BY CENTRE

CENTRE	PERCENTAGE MORTALITY RATE
Sea Point	7.0
Victoria Road - Woodstock	8.9
Albert Road - Woodstock	2.8
Lower Main Road - Observatory	11.5
Mowbray	4.1
Rondebosch	0.0
Claremont	4.9
Kenilworth	0.0
Wynberg	2.7
Diep River	14.2
Muizenberg	25.0
Fish Hoek	5.0
Kalk Bay	11.1
Simonstown	0.0
Goodwood	10.5
Parow	10.9
Bellville	7.8
Durbanville	7.1
Non-Centres	14.4

Non-Centres include scattered distributions or very small clusters.

TABLE 11

NUMBER OF CLOTHING STORES IN C.B.D. AS PERCENTAGE OF TOTAL NUMBER OF CLOTHING STORES IN PENINSULA I.E. RATE OF DECENTRALIZATION

EXCLUDING MALAY QUARTER AND DISTRICT 6		INCLUDING MALAY QUARTER AND DISTRICT 6	
1904	45.0	1904	70.0
1911	41.8	1911	68.03
1921	50.0	1921	60.9
1936	37.85	1936	49.15
1946	29.16	1946	38.69
1951	25.77	1951	33.33
1969	17.41	1969	20.96

PERCENTAGE OF DECENTRALIZATION OF CLOTHING STORES PER ANNUM

1911	0.45
1921	0.82
1936	0.81
1946	0.87
1951	0.68
1969	0.47

TABLE 12

FUNCTIONAL CHANGES WITHIN THE C.B.D.

FUNCTION	1957 (SQ.FT)	1964 (APPROX. PERCENTAGE ONLY)
General Food	2,585	15%
Womens Clothing	5,505	0%
General Clothing	7,022	+ 20%
New Furniture	9,290	+ 50%
Hardware & Electrical Appliances	13,288	- 33%
Soft Furnishings	14,031	- 60%
Car Sales	25,739	- 15%
Department Stores	39,636	+ 15%
Luxury Goods	42,325	+ 100%
Financial Offices	69,382	+ 15%
Service and General Offices	150,701	- 15%
Public and Government	259,346	0%
Industry	294,319	+ 50%
Wholesale and Storage	381,445	- 20%

NOTE : DATA COLLECTED BY DR. D.H. DAVIES. UNFORTUNATELY, THE INFORMATION FOR 1964 IS STILL CONFIDENTIAL AND CANNOT BE PRESENTED HERE.

SHOP TYPE AREA - NETT SQUARE FEET	CENTRAL CAPE TOWN	GREEN POINT	SEA POINT	CAMPS BAY	TAMBOERSKLOOF, GARDENS	MAITLAND, RUGBY, BROOKLYN	MILNERTON	WOODSTOCK, SALT RIVER	OBSERVATORY, MOWBRAY	RONDEBOSCH	CLAREMONT	KENILWORTH	WYNBERG	PLUMSTEAD	MUIZENBERG, FISH HOEK, SIMONSTOWN	KALK BAY	PINELANDS	SMALL CLUSTERS - HIGH CLASS WHITE AREAS	SMALL CLUSTERS - LOW CLASS WHITE AREAS	SMALL CLUSTERS - COLOUR	COLOURED AREAS (e.g. KLIPFONTEIN & LANSDOWNE	NEW COLOURED TOWNSHIPS	GOODWOOD	PAROW	BELLVILLE	DURBANVILLE
MENS OUTFITTERS																										
UNDER 500			58 65		40			62					38						12 30	17						
500-1500	135 120					65	43				43 51										24		90 78		57	
1500-3500	110 110		72					85 85 94		87	40 45		65 48				48						84	115		
OVER 3500	115 110		60					63			72													107	60	
LADIES OUTFITTERS																										
UNDER 500						42				45					43				18				40	54	110	62
500 - 1500	95		85					98 110		45 51	87 84		72 65	65	60			68	45				87 65		125 110	
1500 - 3500	95		60				60	78 69	45		85		60		72								57	95 87		
OVER 3500	80 60					40		70			63															
GENERAL OUTFITTERS																										
UNDER 500	65		45		47			45 53					43								15 27				45	

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CENTRES	PLANNING UNITS	1951 POPULATION	1951 NO. OF STORES	1960 POPULATION	1960 NO. OF STORES	1969 POPULATION	1969 NO. OF STORES
1. Salt River, Woodstock, Observatory	10,18,19, 20,21,22	89262	90	84755	91	80742	79
2. Mowbray	28,29	15856	4	14482	5	13349	8
3. Rondebosch, Rosebank, Newlands	30,31,32, 33	19386	6	20865	4	22473	10
4. Claremont	35,36,37	27970	19	29034	31	31155	39
5. Kenilworth, Wynberg, Plumstead	40,41,42, 43,44,47, 38	50348	41	55881	43	62236	61
6. Diep Riveir, Heathfield, Southfield, Steurhof, Retreat	51,53,55, 56,57	38254	1	56305	2	88499	6
7. Lakeside, Kalk Bay	60,65	8072	3	8147	3	8253	4
8. Fish Hoek	63	4487	6	5600	9	6989	14
9. Simonstown	67	1076	2	1057	3	6639	7
10. Brooklyn, Maitland, Rugby	23,24,25	13401	4	15701	8	18744	3
11. Pinelands	77	7403	0	10424	4	14677	7
12. Windemere	80	25670	0	38043	2	56380	5
13. Langa	76	11888	0	20424	0	35088	2
14. Athlone,Gleemor,Belgravia, Lansdowne,Rylands,Sunny-side, Oltery	34,39,70, 71,72,73, 74,75	60295	16	88984	35	120596	40
15. Epping	105	8989	NO FIGURES	8589	0	8206	2

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SHOP TYPE AREA - NETT SQUARE FEET	500 - 1500	1500 - 3500	OVER 3500
CENTRAL CAPE TOWN	80 95	95 95	110
GREEN POINT			
SEA POINT	60 57	72 50	48
CAMPS BAY			
TAMBOERSKLOOF, GARDENS			
MAITLAND, RUGBY, BROOKLYN			
MILNERTON			
WOODSTOCK, SALT RIVER		60	
OBSERVATORY, MOWBRAY			
RONDEBOSCH			
CLAREMONT	60	60	
KENILWORTH			
WYNBERG	38		
PLUMSTEAD			
MUIZENBERG, FISH HOEK, SIMONSTOWN			
KALK BAY			
PINELANDS			
SMALL CLUSTERS - HIGH CLASS WHITE AREAS			
SMALL CLUSTERS - LOW CLASS WHITE AREAS	28		
SMALL CLUSTERS - COLOURED			
COLOURED AREAS (e.g. KLIPFONTEIN & LANSDOWNE RD			
NEW COLOURED TOWNSHIPS			
GOODWOOD	60	60	
PAROW			
BELLVILLE	70		
DURBANVILLE			

CENTRES	PLANNING UNITS	1951 POPULATION	1951 NO. OF STORES	1960 POPULATION	1960 NO. OF STORES	1969 POPULATION	1969 NO. OF STORES
16. Elsies Rivier	104	4830	NO FIGURES	12636	4	33056	15
17. Tiervlei	87	3734	NO FIGURES	6494	1	11293	2
18. Maitland, Ndabeni	26,27	10632	5	7101	3	5312	6
19. Goodwood, Parow	82,83,86, 88,89	17666	NO FIGURES	65418	34	81768	77
20. Bellville	91,92,93, 94,96	14809	NO FIGURES	16309	26	22304	34
21. Durbanville	123	3408	NO FIGURES	3057	1	3879	3
22. Camps Bay	2	3211	1	4882	0	7577	0
23. Clifton	3	986	0	1213	0	1700	0
24. Sea Point, Green Point	4,5,6,7,8, 9	28698	15	31503	26	34443	29
C.B.D., District 6, Malay Quarter, Tamboerskloof, Oranjezicht, Gardens	11,12,13, 14,15,16, 18	METRO AREA	71	METRO AREA	79	METRO AREA	107

TABLE 15

NEAREST NEIGHBOUR READINGS

1. C.B.D.

1904	0.68	Significant at 1% (4.56)
1911	0.82	Significant at 5% (Not 1%)
1921	1.00	Not significant
1936	0.78	Just significant at 1%
1946	0.71	Ditto
1951	0.71	Ditto
1960	0.74	Ditto
1969	0.42 (overall)	Ditto
Mens	0.52	Ditto
Womens	0.47	Ditto

2. SEA POINT

1936	0.84
1946	0.87
1951	1.01
1960	1.54
1969	0.6

3. VICTORIA ROAD

1936	2.11
1946	1.87
1951	1.72
1960	0.84
1969	0.73

4. ALBERT ROAD

1921	1.04
1936	1.05
1946	0.92
1951	0.86
1960	0.54
1969	0.57

5. CLAREMONT

1911.....	0.7
1921	0.72
1936	0.65
1946	0.56
1951	0.46
1960	0.37
1969	0.37

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TABLE 16

NUMBER OF CLOTHING SHOPS ALONG THE WATERKANT - ADDERLEY - PLEIN AXES AS A PERCENTAGE OF THE TOTAL NUMBER OF CLOTHING SHOPS IN THE C.B.D.

1904	33.0%
1911	47.0%
1921	44.1%
1936	41.8%
1946	44.1%
1951	72.2%
1960	46.1%
1969	42.6%

NUMBER OF CLOTHING SHOPS ALONG THE PLEIN - WATERKANT AXES AS A PERCENTAGE OF THE TOTAL NUMBER OF CLOTHING STORES IN THE C.B.D.

1904	19.0%
1911	37.2%
1921	34.9%
1936	35.2%
1946	49.3%
1951	58.7%
1960	34.9%
1969	32.4%

6. WYNBERG

1911	0.68
1921	0.65
1936	0.71
1946	0.58
1951	0.47
1960	0.37
1969	0.32

7. GOODWOOD

1960	0.52
1969	0.47

8. PAROW

1960	4.8
1969	3.9

9. BELLVILLE

1960	6.2
1969	4.9

10. ELSIES RIVER

1960	1.92
1969	1.87

11. LANSDOWNE ROAD

1960	2.13
1969	2.02

TABLE 17

C.B.D. SHOPPER PATTERNS

NO.OF CASES	% WHITE	% NON-WHITE	% MALE	% FEMALE	% SPECIAL TRIP	WORKERS	% OF PURCHASES
				SHELLEY SHOP			
251	89.42	10.58	0	100.0	75.4	24.6	21.24
				BONDS			
188	29.68	70.32	60.44	39.56	61.31	38.69	9.8
				DENNIS BASSON			
80	73.0	27.0	51.04	48.96	67.6	32.4	40.5
				L & O			
168	90.56	9.44	0.59	99.41	75.81	24.19	24.78

PERCENTAGE	METROPOLITAN	LOCAL	REGIONAL
SHELLEY - BONDS AREA	64	22	14
L & O - BASSONS	81	2	17
AMERICAN EXPERIENCE (NELSON)	40	40	20

ERCENTAGE OF SHOPPERS MOVING FROM WOMENS SHOP TO MENS SHOP NEXT DOOR

HELLEY SHOP - BONDS 0.89%

& O - BASSONS 0.0

OTE: COLOURED MEN APPEAR TO WINDOW SHOP TO A GREAT DEGREE - WOMEN PURCHASE ABOUT THE SAME BUT COLOURED AND WHITE MEN VERY DIFFERENT.

TABLE 18

PERCENTAGE SHIFTS PER CENTRE BY TWO MINUTE WALKING ZONES

NOTA BENE

The centre ring is Zone 1.
The next Zone along to the left is L.2 - to the right R.2

SEA POINT

1904 1 = 0

L.2 = 100	R.2 = 0
L.3 = 0	R.3 = 0
L.4 = 0	R.4 = 0
L.5 = 0	R.5 = 0
L.6 = 0	R.6 = 0
L.7 = 0	R.7 = 0
L.8 = 0	

1911 1 = 0

L.2 = 100	R.2 = 0
L.3 = 0	R.3 = 0
L.4 = 0	R.4 = 0
L.5 = 0	R.5 = 0
L.6 = 0	R.6 = 0
L.7 = 0	R.7 = 0
L.8 = 0	

1921 1 = 0

L.2 = 0	R.2 = 0
L.3 = 0	R.3 = 0
L.4 = 100	R.4 = 0
L.5 = 0	R.5 = 0
L.6 = 0	R.6 = 0
L.7 = 0	R.7 = 0
L.8 = 0	

1936 1 = 0

L.2 = 33⅓	R.2 = 0
L.3 = 0	R.3 = 0
L.4 = 33⅓	R.4 = 0
L.5 = 0	R.5 = 0
L.6 = 0	R.6 = 33⅓
L.7 = 0	R.7 = 0
L.8 = 0	

1946 1 = 0

L.2 = 7.7	R.2 = 0
L.3 = 7.7	R.3 = 0
L.4 = 46.2	R.4 = 7.7
L.5 = 7.7	R.5 = 7.7
L.6 = 0	R.6 = 15.6
L.7 = 0	R.7 = 0
L.8 = 0	

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1951 1 = 8

L.2 = 12	R.2 = 0
L.3 = 12	R.3 = 4
L.4 = 36	R.4 = 4
L.5 = 12	R.5 = 4
L.6 = 0	R.6 = 8
L.7 = 0	R.7 = 0
L.8 = 0	

1960 1 = 12

L.2 = 20	R.2 = 0
L.3 = 8	R.3 = 8
L.4 = 20	R.4 = 0
L.5 = 8	R.5 = 4
L.6 = 0	R.6 = 8
L.7 = 0	R.7 = 8
L.8 = 4	

1969 1 = 13.5

L.2 = 16.2	R.2 = 2.7
L.3 = 8.1	R.3 = 5.4
L.4 = 13.5	R.4 = 0
L.5 = 13.5	R.5 = 2.7
L.6 = 0	R.6 = 5.4
L.7 = 8.1	R.7 = 5.4
L.8 = 8.1	

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VICTORIA ROAD

1904	1 = 0		
	L.2 = 100		R.2 = 0
	L.3 = 0		R.3 = 0
1911	1 = 0		
	L.2 = 100		R.2 = 0
	L.3 = 0		R.3 = 0
1921	1 = 50		
	L.2 = 50		R.2 = 0
	L.3 = 0		R.3 = 0
1936	1 = 33.3		
	L.2 = 33.3		R.2 = 0
	L.3 = 33.3		R.3 = 0
1946	1 = 27.3		
	L.2 = 27.3		R.2 = 9.1
	L.3 = 27.3		R.3 = 9.1
1951	1 = 19.6		
	L.2 = 39.2		R.2 = 9.8
	L.3 = 14.7		R.3 = 9.8
1960	1 = 21.6		
	L.2 = 31.2		R.2 = 16.8
	L.3 = 19.2		R.3 = 7.2
			R.4 = 2.4
1969	1 = 22.4		
	L.2 = 36.4		R.2 = 8.4
	L.3 = 19.6		R.3 = 12.0

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ALBERT ROAD

1904		1 = 0	
	L.2 = 0		R.2 = 0
	L.3 = 0		R.3 = 100
	L.4 = 0		R.4 = 0
1911		1 = 0	
	L.2 = 0		R.2 = 0
	L.3 = 0		R.3 = 100
	L.4 = 0		R.4 = 0
1921		1 = 0	
	L.2 = 0		R.2 = 0
	L.3 = 0		R.3 = 0
	L.4 = 0		R.4 = 0
1936		1 = 0	
	L.2 = 0		R.2 = 6.6
	L.3 = 0		R.3 = 66.0
	L.4 = 0		R.4 = 0
1946		1 = 4.5	
	L.2 = 0		R.2 = 27.0
	L.3 = 0		R.3 = 45.0
	L.4 = 0		R.4 = 22.5
1951		1 = 0	
	L.2 = 5.9		R.2 = 35.4
	L.3 = 0		R.3 = 35.4
	L.4 = 5.9		R.4 = 17.7
1960		1 = 0	
	L.2 = 0		R.2 = 13.5
	L.3 = 0		R.3 = 48.6
	L.4 = 0		R.4 = 37.9
1969		1 = 7.2	
	L.2 = 2.4		R.2 = 19.2
	L.3 = 0		R.3 = 45.6
	L.4 = 2.4		R.4 = 21.6

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CLAREMONT

1904	1 = 55.5		
	T.2 = 0 T.3 = 0		B.2 = 44.5
1911	1 = 70		
	T.2 = 0 T.3 = 0		B.2 30
1921	1 = 71.5		
	T.2 = 14.3 T.3 = 0		B.2 = 14.3
1936	1 = 44.4		
	T.2 = 22.2 T.3 = 0		B.2 = 22.2
1946	1 = 44		
	T.2 = 33 T.3 = 0		B.2 = 23
1951	1 = 50.7		
	T.2 = 25.9 T.3 = 0		B.2 = 23.4
1960	1 = 48.3		
	T.2 = 13.8 T.3 = 2.3		B.2 = 33.5 B.3 = 2.3
1969	1 = 57		
	T.2 = 18 T.3 = 3		B.2 = 21 B.3 = 0

NOTE : T = Top i.e. Zone North of Central Zone
B = Bottom i.e. Zone South of Central Zone

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WYNBERG

1904	1 = 0		
	L.2 = 100		R.2 = 0
	L.3 = 0		R.3 = 0
			R.4 = 0
			R.5 = 0
1911	1 = 0		
	L.2 = 100		R.2 = 0
	L.3 = 0		R.3 = 0
			R.4 = 0
			R.5 = 0
1921	1 = 0		
	L.2 = 87.5		R.2 = 0
	L.3 = 12.5		R.3 = 0
			R.4 = 0
			R.5 = 0
1936	1 = 26.5		
	L.2 = 42.4		R.2 = 5.3
	L.3 = 5.3		R.3 = 0
	L.4 = 5.3		R.4 = 0
			R.5 = 0
1946	1 = 25		
	L.2 = 30		R.2 = 20
	L.3 = 5		R.3 = 5
	L.4 = 5		R.4 = 10
			R.5 = 5
1951	1 = 32		
	L.2 = 20		R.2 = 24
	L.3 = 4		R.3 = 4
	L.4 = 4		R.4 = 12
			R.5 = 4
1960	1 = 28.8		
	L.2 = 27		R.2 = 16.2
	L.3 = 10.8		R.3 = 5.4
	L.4 = 1.8		R.4 = 9.0
			R.5 = 3.6
1969	1 = 33.6		
	L.2 = 23.1		R.2 = 14.7
	L.3 = 8.4		R.3 = 6.3
	L.4 = 2.1		R.4 = 8.4
			R.5 = 4.2

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GOODWOOD

1960 1 = 21.5

L.2 = 12.9
L.3 = 4.3
L.4 = 8.6

R.2 = 17.2
R.3 = 8.6
R.4 = 17.2
R.5 = 4.3
R.6 = 4.3

1969 1 = 23.2

L.2 = 8.7
L.3 = 2.9
L.4 = 8.7
L.5 = 0

R.2 = 23.2
R.3 = 8.7
R.4 = 14.5
R.5 = 2.9

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PAROW

1960 1 = 33.6

L.2 = 21	R.2 = 21
L.3 = 10.5	R.3 = 8.4
L.4 = 0	R.4 = 6.3

1969 1 = 39.1

L.2 = 11.5	R.2 = 23.6
L.3 = 11.5	R.3 = 6.9
L.4 = 2.3	R.4 = 6.9

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